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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte GERHARD PRECHTL,
ANDREAS PETER MEISER, and THOMAS OSTERMANN

Appeal 2018-005943
Application 14/243,332
Technology Center 2800

Before MICHAEL P. COLAIANNI, MICHELLE N. ANKENBRAND, and
LILAN REN, *Administrative Patent Judges*.

REN, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants¹ appeal under 35 U.S.C. § 134 from a rejection² of claims
11–15, 17, 25–29, and 34–41. We have jurisdiction under 35 U.S.C. § 6(b).
We affirm.

¹ The real parties in interest are identified as “INFINEON TECHNOLOGIES AUSTRIA AG, an Austrian company.” Appeal Brief of October 13, 2017 (“App. Br.”), 2.

² Final Office Action of May 16, 2017 (“Final Act.”). In this Decision, we also refer to the Examiner’s Answer of March 21, 2018 (“Ans.”) and the Reply Brief of May 21, 2018 (“Reply Br.”).

CLAIMED SUBJECT MATTER

The claims are directed to “semiconductor devices having a doping region aligned with respect to a contact element in electrical contact with the doping region and methods of manufacturing the same.” Spec. ¶ 1.³

Claims 11 and 25, reproduced below, are illustrative of the claimed subject matter:

11. A semiconductor device, comprising:
 - a semiconductor substrate having a first surface and a first doping region;
 - a first insulating layer directly adjoining the first surface of the semiconductor substrate, the first insulating layer having a first opening arranged above the first doping region;
 - a mask layer directly adjoining the first insulating layer and having a first opening, the first opening in the first insulating layer and the first opening in the mask layer being laterally centred with respect to the first doping region;
 - a second insulating layer on the mask layer and having a first opening above the first opening of the mask layer, the first opening in the second insulating layer being wider than the first opening in the mask layer and the first opening in the first insulating layer, the mask layer comprising exposed portions arranged adjacent to the first opening of the mask layer not covered by the second insulating layer; and
 - at least a first contact element arranged in the first opening of the second insulating layer, the first opening of the mask layer and the first opening of the first insulating layer, the first contact element electrically connecting the first doping region with the mask layer, wherein the contact element is in contact with the exposed portions of the mask layer arranged adjacent to the first opening of the mask layer.

25. A semiconductor device, comprising:
 - a semiconductor substrate having a first surface, a doping area of a first conductivity type, a first doping region of a

³ *Semiconductor Device and Method for Manufacturing a Semiconductor Device*, Application No. 14/243,332 (“Spec.”).

second conductivity type arranged in the doping area, and a contact doping region of the second conductivity type arranged in the first doping region at the first surface, the contact doping region having a higher doping concentration than the first doping region, the semiconductor device being a bipolar transistor;

a first insulating layer directly adjoining the first surface of the semiconductor substrate,

the first insulating layer having a first opening above the contact doping region;

a mask layer directly adjoining the first insulating layer and having a first opening, the first opening in the first insulating layer and the first opening in the mask layer being laterally centred with respect to the contact doping region, wherein the mask layer comprises an electrically conductive material;

a second insulating layer on the mask layer and having a first opening above the first opening of the mask layer; and

at least one contact element arranged in the first opening of the second insulating layer, in the first opening of the mask layer and in the first opening of the first insulating layer, the contact element electrically connecting the contact doping region with the mask layer, the contact element being in contact with sidewalls of the first opening of the mask layer and an upper surface of the mask layer.

App. Br. 22, 23–24 (Claims Appendix).

REFERENCES

The prior art references upon which the Examiner relied in rejecting the claims on appeal are:

Zdebel	US 4,772,566	Sept. 20, 1988
Woo	US 5,262,352	Nov. 16, 1993
Sandhu	US 7,928,577 B2	Apr. 19, 2011

REJECTIONS

The Examiner rejects claims 11–13, 26, 28, 34, 36, 37, and 40 under pre-AIA 35 U.S.C. § 102(b) as anticipated by Woo. Final Act. 2.

The Examiner rejects claims 11–13, 26, 28, 34, 36, 37, and 40 under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Woo. Final Act. 2.

The Examiner rejects claim 14 under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Woo and Sandhu. Final Act. 8.

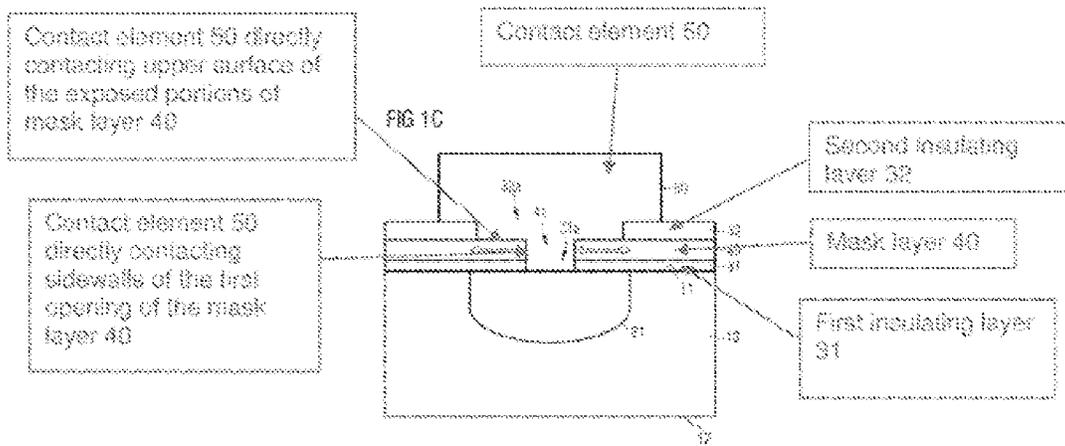
The Examiner rejects claims 15, 17, 25, 27, 29, 35, 38, 39, and 41 under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Woo and Zdebel. Final Act. 9.

OPINION

We review the appealed rejections for error based upon the issues Appellants identify and in light of the arguments and evidence produced thereon. *Cf. Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (cited with approval in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) (“it has long been the Board’s practice to require an applicant to identify the alleged error in the examiner’s rejections”)). After having considered the evidence presented in this Appeal and each of Appellants’ contentions, we are not persuaded that Appellants identify reversible error, and we affirm the Examiner’s decision for the reasons expressed in the Final Office Action and the Answer. We add the following primarily for emphasis.

*Claim 11*⁴

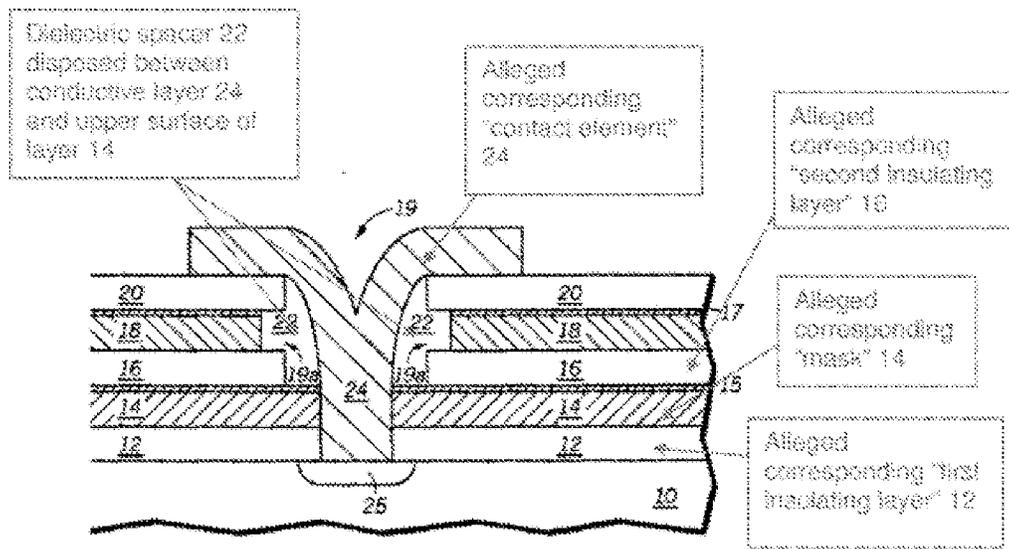
Appellants argue that the Examiner reversibly erred in rejecting claim 11 and proffer a comparison between an annotated Figure 1C embodying the apparatus claim 11 and an annotated Figure 4 of Woo. App. Br. 12. The illustrations are reproduced below.



Application Fig. 1C

Figure 1C of the Specification with Appellants’ annotations. *Id.* at 11.

⁴ Appellants do not present separate arguments for the anticipation and obviousness rejections of claim 11. *See, e.g.*, App. Br. 10–21; Reply Br. 2–8. We therefore address the arguments presented as being directed to both rejections. We note, however, Appellants’ argument is directed to whether the limitation at issue is “taught or suggested by the Woo reference.” App. Br. 13. Appellants also do not present separate arguments for claims dependent from claim 11. *See, e.g.*, App. Br. 10–21; Reply Br. 2–8. These claims, therefore, stand or fall with claim 11. *See* 37 C.F.R. § 41.37(c)(1)(iv) (2013).



Woo Fig. 4

Figure 4 of Woo with Appellants' annotations. App. Br. 12. Appellants argue that claim 11 recites that "the electrically conductive contact [is] directly on top of an upper surface of the mask layer" which is not described in the prior art where the conductive layer "does not contact" the mask layer. *Id.* at 13 (emphases removed).

As the Examiner points out, claim 11 recites that the "contact element is in contact with the exposed portions of the mask layer arranged adjacent to the first opening of the mask layer" without requiring that the contact is direct or that the contact is "on top of an upper surface of the mask layer" as Appellants argue. Ans. 3–5. Appellants' argument, directed to unrecited features of claim 11, does not identify reversible error in the Examiner's fact finding. *See In re Zletz*, 893 F.2d 319, 321 (Fed. Cir. 1989) ("[D]uring patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.").

Appellants' argument that the "exposed portions" recited in claim 11 "refer to a lateral portion of the mask layer that extends out from underneath the second insulating layer" is, likewise, based on language not recited in the claim. App. Br. 13, 20 (emphasis removed). Appellants rely on Figure 8 of the Specification and argue that "the claim implicitly requires that there are some non-exposed portions that are covered by the second insulating layer." *Id.* at 20 (emphasis removed). Appellants argue that the "the exposed portions of the mask layer" should be "a surface that is available for direct physical contact with the first contact element 51 in addition to the sidewalls of the mask layer 40." Reply Br. 7 (emphasis removed).

The Examiner, on the other hand, finds that the embodiments in the Specification show "several portions of the mask layer 40 that are not covered by the second insulating layer 32, which include both the top surfaces of the mask layer 40 adjacent to the opening 41 and the sidewall surfaces of the mask layer 40 facing and adjacent to the opening 41" and that both the uncovered top portions and the uncovered sidewall portions may be included in the "exposed portions." Ans. 3–5 (supporting the analysis with annotated drawings based on those in the Specification); *see also* Final Act. 18–19.

"[W]hile it is true that claims are to be interpreted *in light of* the specification . . . , it does not follow that limitations from the specification may be read into the claims [T]he claims define the invention." *Sjolund v. Musland*, 847 F.2d 1573, 1581–82 (Fed. Cir. 1988). In this case, we decline to limit the claim language to exclude all but Appellants' "implicit" reading of Figure 8 of the Specification. *See* App. Br. 20.

Because the teachings of Woo are undisputed on this appeal, we sustain the Examiner's rejections of claim 11.

*Claim 25*⁵

Appellants argue that the Examiner reversibly erred in finding that Woo teaches or suggests a “contact element being in contact with sidewalls of the first opening of the mask layer and an upper surface of the mask layer” as recited in claim 25. App. Br. 13. Appellants argue that conductive layer 24 in Figure 4 of Woo “does not contact any upper surface layer 14” because a silicidized layer 15 and a dielectric spacer separate layer 14 from layer 24. *Id.*

The Examiner construes the recited “contact element” “to be any element or body that is in physical or electrical contact with another body or element.” Ans. 6. The Examiner explains that the plain language of the claim does not preclude the contact element to include multiple elements, and elements 22 and 24 in Woo would, therefore, constitute the recited contact element. Final Act. 13; Ans. 6.

Appellants' argument that every embodiment shows the recited contact element as formed from a conductive material (App. Br. 18; *see also* Reply Br. 4) does not persuasively explain why that the recited contact

⁵ Appellants do not present separate arguments for the anticipation and obviousness rejections of claim 25. *See, e.g.*, App. Br. 10–21; Reply Br. 2–8. We therefore address the arguments presented as being directed to both rejections. We note, however, Appellants' argument is directed to whether the limitation at issue is “taught or suggested by the Woo reference.” App. Br. 13. Appellants do not present separate arguments for claims dependent from claim 25. *See, e.g.*, App. Br. 10–21; Reply Br. 2–8. These claims, therefore, stand or fall with claim 25. *See* 37 C.F.R. § 41.37(c)(1)(iv) (2013).

element should be formed solely from a conductive material. We, therefore, decline to narrowly construe “contact element” as Appellants propose here. *See Sjolund*, 847 F.2d at 1581–82 (“[W]hile it is true that claims are to be interpreted *in light of* the specification . . . , it does not follow that limitations from the specification may be read into the claims [T]he claims define the invention.”). Appellants’ argument that elements 22 and 24 in Woo “have completely different material characteristics” and “serve completely different functions in the context of Woo’s device” does not structurally distinguish the prior art from the recited “contact element” (which is defined by neither characteristics nor purpose). App. Br. 17.

Furthermore, the Examiner explains that the prior art structure having dielectric element 22 and conductive element 24 is similar to an insulated wire which may prevent short circuiting between element 24 and conductive layer 18. Ans. 8. The Examiner explains that it was known that such an insulated wire may provide “both electrical and physical contact with external electrical devices, even though only the inner core is conductive while the outer layer is insulating.” *Id.* Appellants do not dispute that an insulated wire is known to provide electrical and physical contact with an external device, but argue instead that “many definitions of the term ‘wire’ do not encompass the ‘outer dielectric layer’ portion of the wire.” Reply Br. 5 (emphasis removed). This argument does not explain why the prior art structure is distinguished from the recited limitation and, in fact, acknowledges that the Examiner correctly finds that an insulated wire may include both conductive and dielectric materials. Appellants, therefore, have not identified reversible error in the Examiner’s fact findings in support of the rejection.

Appellants also argue that the Examiner erred finding that Woo's silicidized layer 15 and conductive layer 14 together constitute the "mask layer" recited in claim 25. App. Br. 14–19. The Examiner construes the recited "mask layer" as "as a layer that covers another layer or element and is capable of functioning as a mask." Ans. 6. The Examiner explains that the claim does not preclude a mask layer to include multiple sublayers, and that layers 14 and 15 in Woo may, therefore, constitute the recited mask layer. Final Act. 13; Ans. 6.

Appellants do not propose their own construction of the term "mask layer." *See, e.g.*, App. Br. 14–19; *see also* Reply Br. 2–8. Nor do Appellants adequately explain why the Examiner reversibly erred in finding that the prior art structure teaches a mask layer as construed by the Examiner. *See, e.g.*, App. Br. 14–19; *see also* Reply Br. 2–8. We are, therefore, not persuaded that the Examiner reversibly erred in either construing the term "mask layer" or evaluating Woo's teachings.

Appellants further argue that the Examiner arbitrarily grouped together distinct components in Woo to support the rejection of claim 25, but cited only single components in Woo in rejecting claim 11, even though claim 11 recites many of the same features as claim 25. App. Br. 15. As analyzed in detail *supra*, however, the Examiner provides a detailed explanation as to why prior art elements 22 and 24 may collectively serve as an insulated wire to prevent short circuiting. *See* Ans. 8. Furthermore, although claim 25 is similar to claim 11, they recite different limitations and are stand-alone independent claims. Appellants do not argue that claim 11 would be structurally distinguishable from Woo's device based on the Examiner's fact finding that supports the rejection of claim 25. *See, e.g.*,

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App. Br. 10–13, 19–21. We therefore are unpersuaded that the Examiner’s determinations here are unsupported by either evidence or rational underpinning, or that the Examiner’s findings are arbitrary.

Based on the foregoing, we sustain the rejections of claim 25.

DECISION

The Examiner’s decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED