

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(2) is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte AKIRA ISHIBASHI,
DAVID G. RAVENHALL,
ROY L. SCHULT AND
HENRY W. WYLD

Appeal No. 96-2528
Application 08/011,202¹

ON BRIEF

Before THOMAS, HAIRSTON, and FLEMING, Administrative Patent
Judges.

THOMAS, Administrative Patent Judge.

DECISION ON APPEAL

¹ Application for patent filed January 29, 1993.

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Appellants have appealed to the Board from the examiner's final rejection of claims 1-4. Claims 5-7 have been made subject to a restriction requirement.

Representative claim 1 is reproduced below:

1. A semiconductor device exploiting a multiply connected quantum interference effect comprising:

(a) a semiconductor body;

(b) $n - 1$ ($n \geq 3$) rods of forbidden regions extending along one direction in said semiconductor body;

(c) a single continuous channel region consisting of a plurality of contiguous elemental channel regions, said forbidden regions being provided to divide said channel region into said plurality of elemental channel regions, each of said elemental channel regions forming a continuous closed circuit and surrounding each of said forbidden regions, said channel regions being multiply connected with multiplicity of n and having $(n - 1)$ -fold rotational symmetry around said one direction;

(d) a gate electrode surrounding plural side walls of said channel region; and

(e) source and drain electrodes electrically connected to one and another end of said channel region along said one direction.

The following references are relied on by the examiner:

Abrokwah
1988

4,729,000

Mar. 1,

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Yamada (Japanese Koaki)² 1-225 175
Sept. 8, 1989

Onda et al. (Onda), "Striped Channel Field Effect Transistors With A Modulation Doped Structure", IEDM-89, pp. 125-128 (Dec. 1989).

Claims 1-4 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over a copending application. Claims 1-4 also stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Finally, claims 1-4 stand rejected under 35 U.S.C.

§ 103. As evidence of obviousness, the examiner relies upon Yamada in view of Onda as to claims 1-3, with the addition of Abrokwah as to claim 4.

Rather than repeat the positions of the appellants and the examiner, reference is made to the briefs and the answer for the respective details thereof.

OPINION

² Our understanding of this reference is based upon by a translation provided by the Scientific and Technical Information Center of the Patent and Trademark Office. A copy of the translation is enclosed with this decision.

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Turning initially to the obviousness double patenting rejection, the examiner correctly points out at the top of page 2 of the answer that appellants' brief does not contest this rejection. This observation has been confirmed at page 1 of the reply brief where appellants have indicated that the obviousness-type double patenting rejection has not been argued. In considering the statements made at page 1 of the reply brief, appellants do not contest in any manner the propriety of the rejection. The apparent basis of that position is that there are no allowed claims in the referenced application. This view is misplaced since the rejection is a provisional rejection as stated by the examiner. The essential position as set forth by the examiner of page 7 of the answer, that the claims are not patentably distinct, has gone unrebutted by appellants in the brief and reply brief. Therefore, we sustain the rejection. Note also Ex parte Karol, 8 USPQ2d 1771, 1773-74 (Bd. Pat. App. & Inter. 1988).

Turning next to the rejection of claims 1-4 under the second paragraph of 35 U.S.C. § 112, we will sustain this

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rejection essentially for some reasons set forth by the examiner at pages 3-5 and 8 and 9 of the answer.

It is to be noted that to comply with the requirements of the cited paragraph, 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 and the teachings of the prior art as it would be by the artisan. Note In re Johnson, 558 F.2d 1008, 1016, 194 USPQ 187, 194 (CCPA 1977); In re Moore, 439 F.2d 1232, 1235, 169 USPQ 236, 238 (CCPA 1971).

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Although we agree in principle with the basic positions set forth by appellants at page 6 of the brief that some of the examiner's reasoning appears to do violence to the plain language of the claims especially interpreted in light of the specification, this is not dispositive.

The bulk of claim 1 is consistent with the recitation at the latter half of page 2 of the specification as filed and the first line of page 3, which portion is the summary of the invention in the specification, as well as the discussion beginning at the bottom of page 5 through page 8. The specification, however, confirms some of the concerns raised by the examiner as well as controverts an assertion made by appellants at page 6 of the brief.

On its face, reading claim 1 alone, it would appear that the language at line 11 of the claim 1 reproduced in the brief relating to "said channel regions" at the end of that line should have been more accurately stated to say "said elemental channel regions" since there are plural regions recited. However, according to the disclosure it is not the elemental channel

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regions disclosed which have been characterized as being multiply connected with multiplicity of n and having a $(n-1)$ -fold rotational symmetry around a previously recited one direction. It is, according to the disclosure, proper to interpret the language at the end of line 11 of claim 12 reciting "said channel regions" as "said channel region." It is the channel region 1 according to Figures 1 and 2 and specification, page 2, lines 21-23 and page 7, lines 10-12 which has the recited properties. The amendment filed on December 27, 1994 introduces the plural version of region by adding "s" to the word region compared with the originally filed version of claim 1. Thus, it appears that the present version of claim 1 is misdescriptive on its face.

The examiner also properly raises questions with respect to the language of the channel region being multiply connected with a multiplicity of n . The specification does not aid in understanding what the value or numeric value of n may be even though it is associated with the channel region 1 having two properties. Even though the claim may be interpreted to properly reflect the two properties associated with channel

region 1, what the meaning of a multiplicity of n has in the context of a structural or functional distinction is not fully explained in the specification as filed.

Appellants' position at page 6 of the brief indicates that they consider the elemental channel regions to be regions A-I shown in Figure 2. The specification does not so indicate that these regions labeled A-I are elemental channel regions. They are only described as being nine bound states according to the discussion beginning at page 8, line 6 of the specification. A viewer's characterization of the claimed elemental channel regions conforms to ABFC; ABIE; ADGC and ADHE, but the specification does not discuss the claimed elemental channel regions in this manner. In any event, this characterization meets the claim limitation of each of the elemental channel regions surrounding each of the forbidden regions 2 in Figure 2. In any event, since these noted ambiguities have not been cured by any feature recited in dependent claims 2-4, they are correctly included in this rejection. As such, the examiner's rejection of claims 1-4 under 35 U.S.C. § 112, second paragraph, is affirmed.

Turning lastly to the rejection of claims 1-4 under

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35 U.S.C. § 103, we will sustain each of the two rejections set forth by the examiner, one for claims 1-3 and the other for claim 4, for the reasons set forth by the examiner in the statement of the rejection portion of the answer at pages 5-7 as well as the additional responsive arguments portion of the examiner at pages 9-11.

As to the appellants' position at page 4 of the brief that the structure of claim 1 relating to the gate electrode surrounding the sidewalls of the channel not being met has been addressed by the examiner at pages 9 and 20 of the answer. There, the examiner correctly points out that the claim does not require that the gate electrode completely surround the sidewalls of the channel region even though the Figure 2 depiction of the disclosed invention does so. In any event, we agree with the examiner's view that it was commonly known for better control of the channel current to do so, which position is not challenged by appellants. Furthermore, in light of Onda's teachings, we are also persuaded of the obviousness of this feature since Onda teaches of enhancing the transconductance striped channel FET heterostructure device by so constructing his FET as to increase two

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dimensional squeezing of the conducting channel by applying correct gate voltage. Onda's teachings in effect confirm the examiner's reasoning at the top of page 10 of the answer irrespective of the position of the examiner that it was commonly known in the art to surround a channel region with a gate electrode to enhance or increase control of the channel current.

As to the argument presented at the middle of page 4 of the brief, the examiner's statement of the rejection of claim 1 at pages 5 and 6 of the answer correlates Yamada's teachings to the claimed forbidden regions in the channel region. As to the two-dimensional verses three-dimensional argument at the bottom of page 4 of the brief, we are in agreement with the examiner's position set forth at the middle of page 10 of the answer. It appears that the three-dimensional characteristics of Yamada relate to this argument as confirmed by the Figure 1 (a) top view showing taken with the Figure 1 (b) cross-sectional view of Onda's striped channel FET at page 125 of his article.

The examiner's position at page 11 of the answer addresses the features of dependent claim 2 and meets appellants' arguments at the bottom of page 5 of the brief. Although the specific recitation of the composition of the forbidden regions in claim 3 is expressed at the bottom of page 5 of the brief, they have not been apparently directly addressed by the examiner. We note that the Yamada's disclosure teaches in terms of plural different "types" of semiconductor material relating to the expressly identified

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GaAs material region as well as the AlGaAs regions. Conventionally, in the art semiconductor materials are described as being of "p" or "n" "type" of material. Without expressing

that per se, it is believed that the artisan would have understood two different types of these materials to have been utilized to enable the localization discussed in Yamada.

Finally, as to claim 4, we are in agreement with the examiner's reasoning set forth in the answer. It is true that neither Yamada nor Onda appears to specifically identify the material utilized for the gate electrode in each reference. The title and abstract of Abrokwah, in addition to the columns 6 and 7 portions identified by the examiner of this reference, confirm that it was well known in the art that heterostructure devices of the type set forth by Yamada and Onda would have utilized an appropriate type of InGaAs as set forth in dependent claim 4 on appeal.

In view of the foregoing, we have sustained each of the rejections set forth by the examiner of claims 1-4 on appeal. Therefore, the decision of the examiner is affirmed.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

	JAMES D. THOMAS)	
	Administrative Patent Judge)	
)	
)	
	KENNETH W. HAIRSTON)	BOARD OF
PATENT	Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
)	
	MICHAEL R. FLEMING)	
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