

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MADHUKAR B. VORA

Appeal No. 1999-1940
Application No. 08/654,760

ON BRIEF

Before LALL, GROSS, and BLANKENSHIP, Administrative Patent Judges
LALL, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the Examiner's final rejection¹ of claims 1 to 5, which constitute all of the claims in this application.

The invention is directed to a vertically-integrated EEPROM cell which has two features which distinguish over the prior art. The first principal structural difference is the use of a

¹An amendment, together with a declaration, were filed after the final rejection, see papers 10 and 8 respectively, however, the examiner did not approve the entry of the amendment but did approve the entry of the declaration. See paper no. 13.

self aligned vertical floating gate. The second principal difference is that the bit line is formed on top of the substrate and not in the substrate and makes contact with the drain of every cell at the location of the cell. A further understanding of the invention can be achieved by the following claim:

1. A nonvolatile memory cell array comprised of a plurality of EEPROM memory cells, each cell comprising:

a semiconductor substrate;

a vertical MOS transistor formed by alternating N-type and P-type doped layers in said substrate and wherein a well is etched into said substrate through said alternating N-type and P-type layers such that said alternating layer surround said well, said well having a floating gate of conductive material formed therein which is self aligned to not extend laterally beyond edges of said well and insulated from and overlying said alternating N-type and P-type layers by a layer of gate insulating material;

a word line contact comprising a layer of conductive material formed on said substrate so as to extend down into said well and overlie said floating gate but insulated therefrom by an insulation layer; and

a bit line contact comprising a layer of conductive material formed on said substrate so as to be in electrical contact with the drain region of said vertical MOS transistor formed in said substrate.

The examiner relies on the following reference:

Mori

5,071,782

Dec. 10, 1991

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Claims 2 and 3² stand rejected under 35 U.S.C. § 112, second paragraph. Claim 2 stands rejected under 35 U.S.C. § 102 as being anticipated by Mori. Claims 1 and 3 to 4 stand rejected under 35 U.S.C. §§ 102/103 as being unpatentable over Mori. Claims 3 and 5 stand rejected under 35 U.S.C. § 103 as being unpatentable over Mori.

Rather than repeat the arguments of appellant and the examiner, we make reference to the briefs³ and the answer for the respective details thereof.

OPINION

We have considered the rejections advanced by the examiner and the supporting arguments. We have, likewise, reviewed the appellant's arguments set forth in the briefs.

We affirm-in-part.

We will discuss each ground of rejection separately.

35 U.S.C. § 112, second paragraph

The examiner has rejected claims 2 and 3 under this

² In the statement of the rejection in the examiner's answer at page 7, the examiner rejects claims 1 and 2, however in the body of the rejection, the examiner discusses claim 3 rather than claim 1. Appellant responds as if the rejection were of claims 2 and 3. Accordingly we have considered claims 2 and 3. They should, therefore, also be rejected under 35 U.S.C. § 112, second paragraph.

³ A reply brief was filed as paper no. 16 and the examiner noted its entry without further comment, see paper no. 17.

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rejection at page 7 of the examiner's answer. Appellant argues, at pages 10 and 11 of the brief, against the second paragraph rejection, however, the main argument seems to be that the examiner should have entered the amendment after final rejection which would have eliminated the rejections which the examiner has maintained. We are constrained to consider the claims as they appear in the record. The entry of the amendment after the final rejection is strictly a petitionable matter and is not the before us. Rather than affirming the examiner pro forma on this rejection, we nevertheless, consider the merits of the rejection. We agree with the examiner that indeed, claims 2 and 3 are indefinite for the reasons set forth by the examiner at page 7 of the answer. However, as to claim 2, line 34, we do not agree with the examiner's position that it is unclear what the word line is being insulated from. Our reading of claim 2, lines 34 to 38 convinces us that the bit line is being insulated from the word line by insulating layer 29 as shown in figure 5 of the specification. As to the other specific points raised by the examiner at page 7 of the answer, we are in agreement with the examiner. For example, the word "coincident" (claim 2, line 4),

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requires additional material to convey a definite meaning to the claimed limitation; "surface" (claim 2, line 4 and claim 3, line 5) should be a part of a solid material which forms the claimed drain; and the "word line contact" and the "bit-line contact" are undefined because the two lines make contact with many surfaces and it is unclear which contacts are being recited. Therefore, we will sustain the examiner's rejection of claims 2 to 5 under this ground of rejection.

The rejections under 35 U.S.C. § 102 or §§ 102/103 or § 103.

We noted above that claims 2 to 5 are indefinite, however, with the help of the figures and the text in the specification, we have an understanding of the meanings of the various terms in the claims. Therefore, we shall consider the merits of the claims. All of the rejections on the merits are based on a single reference, namely Mori.

On pages 3 to 5 of the examiner's answer, the examiner asserts that claim 2 is anticipated by Mori. The examiner rejects claims 1 and 3 to 4 under 35 U.S.C. §§ 102/103 over Mori at pages 5 and 6 of the examiner's answer. Further, the examiner

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rejects claims 3 and 5 under 35 U.S.C. § 103 over Mori at page 6 of the answer.

We agree with appellant (reply brief at page 1) that the whole appeal depends on one simple issue. That issue is the interpretation given to the phrase "self-aligned". We agree with the examiner that the process limitations cannot be read into apparatus claims (answer at pages 10 and 11), however, the claims are not to be interpreted in a vacuum. We are persuaded by appellant that the structure resulting from the process described in the specification (see figures 1, 2 and 20, and table at pages 13 to 15 of the specification), leads one to conclude that appellant is correct in his interpretation of the claims (reply brief at page 6), when appellant states "[t]he correct interpretation is that it will not have any horizontal component on the surface of the substrate or on the bottom of the well and therefore will not extend beyond the perimeter of the trench." With this interpretation of the claims and observing figures 1b and 4b of Mori, we are not convinced that Mori anticipated the claimed limitations of claim 1. Moreover, we are of the view

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that the examiner is indulging in speculation when she makes the statement (answer at page 4), that: "[f]loating gate FG is 'self aligned . . . so as to not extend beyond the edges of said well,' because FG does not extend beyond the edges of the well." The examiner has not pointed to any specific recitation in the text of Mori to buttress this position. Therefore, we do not sustain the anticipation rejection of claim 2⁴ by Mori.

With respect to the rejection of claims 1, and 3 and 4 under §§ 102/103, we note that this rejection suffers from the same deficiency as noted above, that is, the configuration resulting from the process of achieving a "self aligned" structure which has no horizontal components to the floating gate is not shown by Mori and the examiner has not provided any evidence to support the contention that it would have been obvious to supply Mori with a floating gate having the recited structure. Therefore, we do not sustain the rejections of claims 1, and 3 to 4 over Mori.

⁴We note that in claim 2, line 16, the phrase "first layer of insulating material" lacks proper antecedent basis because line 14 of claim 2 eliminates the definition of a first layer. In any future prosecution of this application, we recommend that the examiner and the appellant to assure that proper antecedence is provided for the recited "first layer".

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With respect to claims 3 and 5, the obviousness rejection over Mori explained at page 6 of the examiner's answer is also not sustainable because of the same deficiency. Claim 3 has already been discussed. In addition, we point out that claim 3 also recites a spacer layer (lines 22 to 23) and the examiner has not provided a reason why it would have been obvious to provide the spacer layer other than the bare statement that "otherwise the bitlines and wordlines would be shorted out" (answer at page 6). Therefore, we do not sustain the obviousness rejection of claims 3 and 5 over Mori.

In conclusion, we have sustained the rejection of claims 2 to 5 under 35 U.S.C. § 112, second paragraph, but have not sustained the rejection under 35 U.S.C. § 102 of claim 2, the rejection under 35 U.S.C. §§ 102/103 of claims 1 and 3 to 4, or the rejection under 35 U.S.C. § 103 of claims 3 and 5.

Accordingly, the decision of the examiner rejecting claims 1 to 5 is affirmed-in-part.

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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-IN-PART

PARSHOTAM S. LALL)	
Administrative Patent Judge)	
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ANITA PELLMAN GROSS)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
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HOWARD B. BLANKENSHIP)	
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