

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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 12

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte THOMAS H. BAUM, PAUL B. COMITA
and FRANKLIN M. SCHELLENBERG

Appeal No. 96-0294
Application 08/168,569¹

ON BRIEF

Before METZ, GARRIS and OWENS, **Administrative Patent Judges**.

METZ, **Administrative Patent Judge**.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the examiner's refusal to allow claims 1 through 9, all the claims in this application.

¹ Application for patent filed December 16, 1993.

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THE INVENTION

The appealed subject matter is directed to a method for repairing a defect in the light transmissive, non-printing region of a phase-shifting mask. Phase-shifting masks are useful in the production of integrated circuits. Appellants describe phase-shifting masks as generally comprising "a plurality of individual transmissive phase-shifting layers disposed in a pattern on a transmissive substrate." (page 1, lines 14 through 16 of the specification).

Claim 1 is believed to be adequately representative of the appealed subject matter and is reproduced below for a more facile understanding of the claimed subject matter.

1. A method for repairing a defect in the transmissive nonprinting region of a phase-shifting mask comprising the step of depositing an opaque material on the defect from a gaseous precursor by beam-induced deposition.

The references of record which are being relied on by the examiner as evidence of obviousness are:

Kellogg et al. (Kellogg)	4,698,236	Oct.
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6, 1987		
Drozdowicz et al. (Drozdowicz)	4,778,693	Oct. 18,
1988		
Harriott et al. (Harriott)	5,273,849	Dec. 28,
1993		

Claims 1 through 9 stand rejected under 35 U.S.C. § 103 as unpatentable from the disclosure of Drozdowicz. Claims 1 through 9 stand further rejected under 35 U.S.C. § 103 as being unpatentable from the disclosure of Harriott considered with Kellogg. Because we are of the opinion that the examiner has failed to establish that the subject claimed by appellants would have been *prima facie* obvious at the time appellants' invention was made, we shall reverse the examiner's rejection for reasons set forth below.

OPINION

We agree with the examiner's conclusion that the art on which he has relied to reject the appealed claims establishes that at the time appellants' invention was made it was well-known in the art to repair defects in lithographic masks. We also agree with the examiner that the art relied on shows that such repair is effected by laying down opaque solid materials from gaseous precursors on lithographic masks. However, in each of the references relied on by the examiner, the mask repaired included opaque patterns. The masks were designed to

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exclude light from reaching the substrate (photoresist) beneath the mask and the defect was a transparency (hole) in the opaque patterns. See for example column 1, lines 17 through 19 of Kellogg ("alteration of a precisely localized site on a substrate such as a transparent defect site in a photolithographic mask."); column 3, lines 11 through 14 of Drozdowicz ("The metal film deposits produced by this method, when extended over adjacent clear (missing chrome) defect areas, make these clear areas opaque, thus effecting the repair."); and column 6, line 11 of Harriott ("repairing a transparent defect in said pattern").

Here, the claimed subject matter requires that the mask being repaired be a particular type of mask, a phase-shifting mask, which is not shown by any of the references on which the examiner has relied and is designed to permit light through the mask to be shifted for the purpose of causing coherent destructive interference. The defect in appellants' mask is not a transparency (hole) in an opaque pattern.

We have not overlooked pages 5 and 6 of the Examiner's Answer wherein the examiner opines:

it is not all that surprising that a relatively small area of the transmissive region which is rendered opaque does not adversely affect

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destructive interference which occurs at the boundary between phase shifting and transparent regions.

We understand the examiner's explanation, found under the heading "Response to Argument", to mean that so long as the defect is small, rendering said small defective region opaque would not have been expected to adversely effect the phase-shifting properties of the remainder of the region of the mask which is not defective. Neither have we overlooked the fact that appellants did not respond to the above-noted reasoning. Nevertheless, we still cannot find in this record any suggestion to use the well-known prior art methods for repairing transmissive non-printing regions of a phase-shifting mask as claimed in appellants' method.

There is simply no evidence in the record which establishes that a phase-shifting mask having an opaque material-covered defect would have been expected to retain its phase-shifting properties. Further, absent any suggestion in the prior art to apply to the particular substrate claimed the technique shown in the patents on which the examiner has relied as evidence of obviousness, we cannot agree with the examiner's conclusion that the claimed subject matter would have been obvious at the time appellants' invention was made.

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Accordingly, we shall reverse the examiner's rejection of
claims 1 through 9.

SUMMARY

The decision of the examiner is **reversed**.

REVERSED

ANDREW H. METZ)
Administrative Patent Judge)
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BRADLEY R. GARRIS) BOARD OF
PATENT Administrative Patent Judge) APPEALS AND
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