

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(2) is not binding precedent of the Board.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 GIANG T. DAO

Appeal No. 95-3017
Application 07/952,061¹

ON BRIEF

Before THOMAS, HAIRSTON and BARRETT, Administrative Patent Judges.

THOMAS, Administrative Patent Judge.

DECISION ON APPEAL

Appellant has appealed to the Board from the examiner's final rejection of claims 1 to 12, and 15 to 31.

Pages 4 and 5 of the final rejection indicate that claims 13 and 14 are objected to as being dependent upon rejected base claims but would be allowable if rewritten in independent form

¹ Application for patent filed September 25, 1992.

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including all the limitations of the base claims and any intervening claims.

Representative claim 1 is reproduced below:

1. A reticle blank for use in fabricating a reticle to pattern a radiation sensitive layer in a lithographic printer, said reticle blank having a region comprising a pattern of features, said features having a size that is below the resolution of said printer, wherein said region transmits a reduced portion of radiation incident thereon, said reduced portion of radiation being relatively uniform underneath said pattern.

The following references are relied on by the examiner:

Smith et al. (Smith)	4,890,309	Dec. 26, 1989
Pease et al. (Pease)	5,135,609	Aug. 4, 1992

Claims 1 to 6, 9 to 12, 15 to 25 and 28 to 31 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. In a new rejection under this statutory basis in the answer, the examiner included claims 7, 8, 22, 23, and 25 in this rejection. As such, the claims on appeal under this statutory basis remain claims 1 to 12, 15 to 25 and 28 to 31.

Claims 1 to 6 stand rejected under 35 U.S.C. § 102(a) as being anticipated by Pease.

Claims 7 to 12 and 19 to 31 stand rejected under 35 U.S.C. § 103 as being obvious over the collective teachings of Pease in view of Smith. The examiner incorrectly includes dependent claim 25 in this grouping, which claim depends directly from claim 13

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which, as indicated earlier, is an objected to claim. As such, the claims at issue under 35 U.S.C. § 103 remain claims 7 to 12, 19 to 24 and 26 to 31. There is no outstanding rejection under any statutory basis as to the objected to claims 13 and 14.

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

OPINION

Turning first to the rejection of claims 1 to 12, 15 to 25 and 28 to 31 under the second paragraph of 35 U.S.C. § 112, 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).

We have reviewed and considered the examiner's reasons in support of the rejection, but are not convinced that the cited claims fail to comply with the second paragraph of 35 U.S.C.

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§ 112. At the outset, we note that the breadth of the claims is not equated with indefiniteness of the claims. See In re Miller, 441 F.2d 689, 693, 169 USPQ 597, 600 (CCPA 1971). It is perfectly permissible for appellant to claim his invention in terms as broad as his application disclosure will support.

It appears that the examiner's basic position is that the word "relatively" and the word "approximately" as appropriate modifiers render indefinite the respective phrases questioned by the examiner. The respective phrases in their entirety as questioned by the examiner are, in our view, set forth with a reasonable degree of precision and particularly when read in light of the disclosure and the teachings of the prior art as they would be by an artisan. Each of the questioned phrases mirrors the manner in which the respective ranges or relative uniformity are set forth in the specification as filed. We do not perceive that the phrases as a whole would deceive the artisan as to discerning what is or what is not encompassed by the claimed invention. The art as a whole does not, in our view, exact the preciseness of a mathematical definition of uniformity as urged by the examiner. Our understanding of the art is such that the art tolerates some limited sense of relativeness of ranges or terms because of manufacturing tolerances anyway. The

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respective ranges seem to us to be well known in the art from our assessment of the prior art relied upon by the examiner, as well as appellants' assessment of the prior art in the early pages of the specification of the disclosed invention. Therefore, we reverse the outstanding rejection of certain claims under 35 U.S.C. 112, second paragraph.

On the other hand, we do sustain the rejection of claims 1 to 6 under 35 U.S.C. 102 as being anticipated by Pease essentially for the reasons set forth by the examiner. The examiner's reference to column 3, lines 43 to 53 and column 4, line 64 to column 5, line 31 is significant. We also extend this column 5 reference to the end of the sub-topic discussion at line 48.

The claimed blank/reticle in independent claim 1 is said at column 2, lines 3 to 5 of Pease to directly correspond to the term "mask" in Pease. Indeed, the non-customized masks are generic or master masks in Pease. The entire background of the invention at columns 1 and 2 of Pease corresponds to the use of such reticle being used by lithographic printers for producing a pattern on a radiation sensitive layer of an integrated circuit structure. Claim 1 requires a "region" which comprises a "pattern of features", which as disclosed, may be more specifi-

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cally recited as a region 22 such as in Figure 2 comprising a pattern of subresolution features. The pattern is made up in the exemplary Figure 2 of subregions 22a and 22b. To the extent claimed, it is clear to us from the above referenced portions of columns 3 to 5 of Pease as relied upon by the examiner that it is the disclosed trenches 118 in representative Figure 1 of this reference which correspond to the claimed pattern of features that are below the resolution of the printer set forth in claim 1 on appeal. This pattern is set forth in the generic/master mask 11 at the bottom of Figure 2. This region is also pertinent to the subject matter of dependent claim 2 on appeal.

Although it is clearly the intent of Pease in the above noted referenced portions of this reference not to image the trenches on the underlying die, it is revealed at column 5, lines 27 to 31 that some light, "a small amount of light" may be projected on the region of the die corresponding to the positions of the trenches. This teaching clearly indicates to the artisan that there is some attenuation of the light corresponding to the trench location in such a manner as to correspond to the reduced portion of radiation incidence upon the die to the extent recited in claim 1 on appeal. As such,

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we conclude that to the extent broadly cited at the end of claim 1, the reduced portion of radiation corresponding to the small amount of light reaching the die would have been "relatively uniform" underneath the pattern of the trenches. Note again the depiction of the generic/master mask 110 at the bottom of Figure 2.

In view of these teachings and findings, we also conclude that appellant's arguments in the brief and reply brief with respect to this rejection of claims 1 to 6 under 35 U.S.C. § 102 are misplaced. Although we agree with appellant's basic premise that absolutely no part or purpose of Pease is such to reproduce any transmission of light under the tiles (that is tiles 112 and 114 in representative Figure 1 of Pease also depicted at the bottom of Figure 2 in generic/master mask 110), clearly there is a relatively uniform portion of radiation transmitted through the subresolution trenches by the small amount of light that may be imaged on the die in accordance with the above noted portion of column 5. Even in a normal operation sense of Pease, when there is no light at all transmitted through the trenches, the trench position would still be indicated by contrast in accordance with the showing at the bottom of Figure 2 for the generic/master mask 110 shown there. As such, there

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would be a total reduction of radiation incident there which still would be consistent with the breadth of the language of "a reduced portion of radiation incident thereon" of claim 1 on appeal. It would therefore still be relatively uniform since it would be totally uniform underneath the pattern.

Since there are no arguments presented in the brief and reply brief as to the features of dependent claims 2 through 6 on appeal, they fall with our consideration of independent claim 1 under 35 U.S.C. § 102.

Turning to the rejection of claims 7 to 12 and 19 to 24 and 26 to 31 under 35 U.S.C. § 103 in light of the collective teachings of Pease in view of Smith, we affirm in part this rejection as to certain claims as set forth in accordance with our analysis to follow.

Initially, we conclude that Pease is properly combinable with Smith under 35 U.S.C. § 103 at least for the reasons set forth by the examiner at the sixth page of the answer, that reason essentially being that Smith teaches the desirability of reducing edge blurring that results from the effects of diffraction, an obvious enhancement to the teachings in Pease.

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This feature argued by the examiner is a stated feature in the abstract of the invention of Smith as well as one developed at columns 1 and 2 of Smith.

There are, however, more compelling reasons for the combinability of the references maintained within both references in a complementary manner. The alternative embodiments heading at the bottom of column 7 of Pease indicates its appropriateness to masking utilizing masks appropriate to X-ray methodologies as well as to the optical-light methodologies which are the basis of the principal disclosure in Pease. In a complementary sense, Smith's teachings focus upon X-ray lithographic replication approaches in most of the figures and columns. However, Figure 7 and the discussion beginning at column 5 to the end of this patent focus upon optical and ultraviolet radiation approaches. Note the discussion beginning at column 5, line 56 of Smith. Thus, it is clear to us that the artisan would have considered the teachings of Smith as applicable as an obvious enhancement to those of Pease and vice-versa.

This combinability was necessary by the examiner to reach the phase-shifting feature at the end of independent claim 7 on appeal. Clearly, both embodiments of Smith teach that phase-shifting is a normal part of the lithographic mask fabrication

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art in general. It is well taken that it is a given in the art that according to appellant's consideration of the prior art that 180E phase-shift is the desirable norm in the art to achieve the type of non-blurring registration for the desired features. The optical version in Smith's figure 7 clearly shows that this relative phase-shifting occurs by different thicknesses of the underlying transparent quartz substrate, which is the same approach taken by appellant in the disclosed invention as well as the same approach recognized by appellant himself in his own discussion of the prior art in the earlier pages of the specification. Thus, as to this feature, it recites nothing that the art does not recognize anyway.

The claimed second region of claim 7 corresponds to the substance of claim 1. Therefore, it is met to the same extent we have considered claim 1 to have been anticipated by Pease. Moreover, the claimed first region of claim 7 would therefore by inference correspond to the transparent underlying substrate portion, which feature is taught to be common in both references. As noted earlier with respect to our discussion of claim 2, the subject matter of claim 8 is also met for the same reason.

Turning to the feature recited in claims 9 and 10, the broadly defined "approximate" range in each of these claims is

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taught at least by the small amount of light referenced in the above-identified portion of Pease at column 5, lines 26 to 31. Note the 10 percent transmission in Smith at column 3, lines 35 to 38, the general reference in the summary of the invention in Smith at column 2, lines 5 to 8 of a relatively low percentage and a similar low percentage mentioned at column 5, line 69 to column 6, line 3. Additionally, this percentage recited in these claims is encompassed by the admitted prior art as mentioned at the bottom of page 2 of the specification as filed.

As to the identical recitation in dependent claims 11 and 12 of the broadly defined "approximate" size of the pattern features, note again the teachings with respect to them at columns 3 to 5 as discussed with respect to the dimensions of the trenches in Pease.

Appellant's arguments with respect to the rejection under Section 103 overemphasize Pease's teachings, fail to consider all of them and only passingly discuss those of Smith, while losing sight of what he has admitted is in the art anyway. However, we part company with the examiner's views as to claims 19 to 31, essentially agreeing with appellant's arguments, with respect to the features in these claims. Both the trenches and tile regions of Pease are not reasonably taught or suggested to

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be subresolution even though the trench region may be a subresolution transmitting region. Smith's teachings and suggestions do not appear to us to cure this defect of Pease. Therefore, we reverse the rejection of claims 19 to 31 under 35 U.S.C. § 103.

New Issues Under 37 CFR § 1.196(b) and (d)

Claims 15 to 18 are rejected under 35 U.S.C. § 103 in light of the collective teachings of Pease and Smith. As to these claims, there is a feature commonly recited in these claims of the phase-shifting capability as a function of the thickness of the underlying base region which has been discussed earlier. We note the specification page 2 admitted prior art discussion with respect to this feature, the brief summary of the invention at page 2 of the brief discussing the prior art, the specific phase shifting capability of the optical embodiment in Smith with respect to Figure 7 beginning at column 5, line 56 to the end of Smith's patent.

In light of these findings and in view of the provisions of 37 CFR § 1.196(d), we make a recommendation to the primary examiner that objected to/allowed claims 13 and 14 be rejected

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on the same basis as claims 15 to 18 since the subject matter of each of these claims 13 and 14 is identical to the same subject matter recited in each of claims 15 through 18.

SUMMARY

We have reversed the rejection of certain claims under the second paragraph of 37 CFR § 112. We have sustained the rejection of claims 1 to 6 under 35 U.S.C. § 102 and we have sustained the rejection of claims 7 to 12 under 35 U.S.C. § 103. We have reversed the rejection of claims 19 to 31 under 35 U.S.C. § 103. Therefore, the examiner's decisions rejecting the claims on appeal are affirmed-in-part.

Finally, we have instituted a new ground of rejection as to claims 15 to 18 and recommended a new ground of rejection be made by the primary examiner as to claims 13 and 14. As to this latter recommended rejection under the provisions of 37 CFR § 1.196(d), we also hereby remand the application to the examiner for consideration of a rejection of dependent claims 13 and 14.

A period of two months is set in which the appellant may submit to the Primary Examiner an appropriate amendment, or a showing of facts or reasons, or both, in order to avoid the grounds set forth in the statement of the Board of Patent Appeals

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and Interferences under the provisions of 37 CFR § 1.196(d) and/or prosecute further before the Primary Examiner by way of amendment or showing of facts, or both, not previously of record with respect to the new rejection under 37 CFR § 1.196(b) if the appellant so elects.

Upon conclusion of the proceedings before the Primary Examiner on remand, this case should be returned to the Board by the Primary Examiner so that the Board may either adopt its decision as final or render a new decision on all of the claims on appeal, as it may deem appropriate. Such return for this purpose is unnecessary if the application is abandoned expressly or as the result of an unanswered Office action, allowed or again appealed.

We note that 37 CFR § 1.196(b) provides that a new ground of rejection pursuant to the rule is not considered final for the purpose of judicial review under 35 U.S.C. §§ 141 or 145.

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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 and REMANDED

37 CFR § 1.196(b) and (d)

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