

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte TETSUYA ISHII

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Appeal No. 1999-1656  
Application No. 08/638,759

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HEARD: FEBRUARY 5, 2002

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Before RUGGIERO, LALL, and BLANKENSHIP, Administrative Patent Judges.

BLANKENSHIP, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1-12, which are all the claims in the application.

We affirm-in-part.

BACKGROUND

The invention is directed to an optical system having an element for attenuating diffraction light of order other than that necessary for forming an image. Claim 1 is reproduced below.

1. An optical system for forming an image of an object, the optical system comprising:

at least one diffraction optical element for receiving light from the object and for diffracting the light from the object to produce first diffraction light of a given order and second diffraction light of at least one order other than the given order;

at least one refraction optical element in series with the at least one diffraction optical element; and

a diffraction light selection element, arranged in series with the at least one diffraction optical element and the at least one refraction optical element, for receiving the first diffraction light and the second diffraction light, transmitting the first diffraction light and attenuating the second diffraction light.

The examiner relies on the following references:

Nose	4,539,482	Sep. 3, 1985
Hugle et al. (Hugle)	5,517,279	May 14, 1996 (filed Aug. 30, 1993)

Claims 2, 5, and 6 stand rejected under 35 U.S.C. § 102 as being anticipated by Nose.

Claims 1-12 stand rejected under 35 U.S.C. § 103 as being unpatentable over Hugle and Nose.

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We refer to the Final Rejection (mailed May 7, 1998) and the Examiner's Answer (mailed Mar. 2, 1999) for a statement of the examiner's position and to the Brief (filed Jan. 15, 1999) and the Reply Brief (filed Apr. 30, 1999) for appellant's position with respect to the claims which stand rejected.

### OPINION

#### Section 102 rejection over Nose

In the rejection of claims 2, 5, and 6 as being anticipated by Nose, the examiner points to "kerfs" 94, 97 (Fig. 24) or "light-intercepting masks" 106, 109 (Fig. 26) as "diffraction light selecting elements." (Answer at 4.) Appellant disagrees (Brief at 11-13).

As described in the reference's "Background of the Invention," a prior art facsimile apparatus (Figs. 1 and 2) used imaging lenses 7<sub>1</sub>, 7<sub>2</sub>, 7<sub>3</sub>, for conveying images from original document 5 to solid sensors 9<sub>1</sub>, 9<sub>2</sub>, 9<sub>3</sub>. Nose at col. 1, ll. 12-56. However, there were problems inherent in the manufacture and use of discrete imaging lenses. Id. at col. 3, ll. 27-68. Nose's solution was to replace the discrete lenses of the prior art with zone plates (e.g., Fresnel type). Id. at col. 4, ll. 1-42.

The structure shown in Figure 24 of Nose for imaging the original 89 comprises means for intercepting light 91<sub>1</sub> through 91<sub>4</sub>, zone plates 92<sub>1</sub>, 92<sub>2</sub>, 92<sub>3</sub>, substrates 93, 96 secured together by adhesive 95, light-intercepting kerfs 94<sub>1</sub>-94<sub>4</sub> and 97<sub>1</sub>-97<sub>4</sub>, and sensors 99<sub>1</sub>, 99<sub>2</sub>, and 99<sub>3</sub>. Id. at col. 10, ll. 34-45. The light-intercepting kerfs serve to block light

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other than the (positive) first-order diffracted light, which would otherwise enter an adjacent sensor group as stray light. Id. at col. 9, l. 53 - col. 10, l. 33. A similar apparatus is described at column 10, line 54 through column 11, line 14, and shown in Figure 26, but with light-intercepting masks 106, 109.

In arguments with regard to the scope of the claimed “numerical aperture limiting member,” appellant offers one definition (Brief at 12), from the Handbook of Optics, for “numerical aperture.” Appellant offers another definition in the Reply Brief (at 10-11) from the McGraw-Hill Dictionary of Scientific and Technical Terms, which is substantially the same as that we find in another reference. “Numerical aperture Optics. a measure specifying the resolving power of a microscope, calculated by multiplying the refractive index of the medium occupying the objective space by the sine of the angle between the most oblique ray entering the objective and the optical axis.” Academic Press Dictionary of Science and Technology, Harcourt, available at <http://www.harcourt.com/dictionary/def/7/0/4/5/7045800.html> (Feb. 8, 2002).

However, appellant discloses several environments in which the numerical aperture limiting member is put to use. In only one (Fig. 7) is the member, as louver 30, used within a microscope optical system. Even there, louver 30 is not in a position to limit light entering the objective lens (i.e., first lens group 96), and therefore cannot be a “numerical aperture limiting member” in the terms of the definition offered in the Reply Brief. Further, even in view of the broader Handbook of Optics definition (Exhibit A filed with the Brief),

the disclosed member (30 or 33 in the instant figures) is not in a position to affect “the slope angle of the marginal ray exiting the lens.” Rather, the member is in a position to affect light rays incident upon an imaging element (e.g., instant Fig. 2).

Appellant’s disclosure (e.g., page 10, first full paragraph) indicates that the “numerical aperture limiting member” is to be defined in somewhat broad terms. The specification, at the bottom of page 8 through page 11, provides guidance with respect to the scope of the claims. The paragraph bridging pages 9 and 10 defines the numerical aperture limiting member in structural and functional terms: “the diffraction light flux of the unrequired order incident on the NA [numerical aperture] limiting member 30 [Fig. 1] is absorbed substantially by the light shielding layer 31, so that only a part of the diffraction light flux of the unrequired order can be passed through the light shielding layer 31.”

In view of the record before us, we conclude that the broadest reasonable definition of “numerical aperture limiting member” does not exclude the light-intercepting kerfs (Fig. 24) or light-intercepting masks (Fig. 26) as disclosed by Nose. Appellant further argues (Reply Brief at 9-10) that the light-intercepting masks are not “arranged in series with the at least one diffraction optical element,” as required by instant claim 2.

Claim 2 sets forth “at least one” diffraction optical element. Zone plate 103 (Fig. 26 of Nose) is a monolithic structure (see, e.g. col. 6, ll. 4-44) and could be considered a single diffraction optical element. Alternatively, the zone plates 103<sub>1</sub>, 103<sub>2</sub>, 103<sub>2</sub> could be

considered as three diffraction optical elements. In either case, the claim 2 “at least one diffraction optical element” reads on the one or the plurality of optical elements.

The claim 2 “numerical aperture limiting member” sets forth nothing different from the Figure 26 structure comprised of substrate 104, 107, the four light-intercepting masks 106, and the four light-intercepting masks 109. We find the diffraction light selection element to be arranged in series with respect to the light passing through zone plate 103 (or through zone plates 103<sub>1</sub>, 103<sub>2</sub>, 103<sub>2</sub>) toward sensors 112. We also note the similarity with respect to, for example, appellant’s louver 30 (Figure 2) arranged in series with the single diffraction lens 72 and imaging element 60.

Finally, we observe that although appellant argues about limiting numerical aperture of a lens, instant claim 2 recites that the numerical aperture limiting member is for “limiting numerical aperture of the optical system for the second diffraction light” (emphasis added). The apparatus disclosed by Nose is designed to block light of orders other than the desired first order from the image sensing elements. Thus, even if one were to use a definition for “numerical aperture limiting member” narrower than that indicated by the instant disclosure, blocking the “second diffraction light” in the Nose apparatus would limit the “numerical aperture of the optical system” by virtue of absorption of the second diffraction light within the system.

We thus are unpersuaded that the examiner’s finding of anticipation is erroneous with respect to instant claim 2. Nor do we see any basis for appellant’s view that the

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numerical aperture limiting member is not “disposed near an imaging position of the optical system” (Claim 5), or that the member does not comprise “a plurality of light transmitting portions and a plurality of light screening portions which are arranged alternately in one plane” (Claim 6). We sustain the rejection of claims 2, 5, and 6 under 35 U.S.C. § 102 as being anticipated by Nose.

Section 103 rejection over Hugle and Nose

Because we find that claims 2, 5, and 6 are anticipated by Nose, we sustain the rejection of those claims under section 103 as being unpatentable over Hugle and Nose, and consider Hugle to be merely cumulative in the rejection. A finding of anticipation means that the claims are also obvious under 35 U.S.C. § 103, since "anticipation is the epitome of obviousness." See, e.g., Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 1548, 220 USPQ 193, 198 (Fed. Cir. 1983); In re Fracalossi, 681 F.2d 792, 794, 215 USPQ 569, 571 (CCPA 1982); In re Pearson, 494 F.2d 1399, 1402, 181 USPQ 641, 644 (CCPA 1974).

As for the remainder of the claims, appellant argues that Hugle teaches a “field-lens” array 48 for reducing cross-talk in the imaging system. The field lenses serve to collimate the light. Because the undesired light “gets lost in the system” -- does not reach the imaging plane -- appellant urges that the teachings of Nose would be inapplicable. See Hugle at col. 9, ll. 13-45.

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We find appellant's arguments convincing, and consider the proposed combination to be not well founded. Nose deals with problems inherent in diffracted light which is decidedly not collimated (e.g., not parallel); see Figures 4 and 5, with the accompanying description. While the "diffractive elements" of Hugle might "introduce higher orders of light which are unaffected by the field lenses" (Answer at 10), we consider the position to be speculative in view of the objective teachings of the two references before us. Nor is there sufficient evidence that combining "several lens arrays in series...to correct for the effect of chromatic aberration" (Hugle at col. 9, ll. 36-37) would lead the artisan, in view of the teachings of Nose, to replace or complement a field lens array as disclosed by Hugle.

The allocation of burdens requires that the USPTO produce the factual basis for its rejection of an application under 35 U.S.C. § § 102 and 103. In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984) (citing In re Warner, 379 F.2d 1011, 1016, 154 USPQ 173, 177 (CCPA 1967)). We consider the references applied insufficient to support the ultimate conclusion of prima facie obviousness, and cannot sustain the section 103 rejection of claims 1, 3, 4, and 7-12.

#### CONCLUSION

The rejection of claims 2, 5, and 6 under 35 U.S.C. § 102 as being anticipated by Nose is affirmed. The rejection of claims 1, 3, 4, and 7-12 under 35 U.S.C. § 103 as being

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unpatentable over Hugle and Nose is reversed, while the rejection of claims 2, 5, and 6 over Hugle and Nose is affirmed. The examiner's decision in rejecting claims 1-12 is thus 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

JOSEPH F. RUGGIERO	)	
Administrative Patent Judge	)	
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	)	BOARD OF PATENT
PARSHOTAM S. LALL	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
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HOWARD B. BLANKENSHIP	)	
Administrative Patent Judge	)	

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MR. JAMES E. LEDBETTER, ESQ.  
STEVENS, DAVIS, MILLER & MOSHER, L.L.P.  
1615 L STREET, NW SUITE 850  
P. O. BOX 34387  
WASHINGTON DC 20043-4387