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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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 26

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MASAMI ITO, MAKOTO KATO,
KANJI NISHII, ATSUSHI FUKUI,
and KEIICHI FUJIKAWA

Appeal No. 96-2953
Application 08/258,465¹

ON BRIEF

Before HAIRSTON, BARRETT and HECKER, **Administrative Patent Judges**.

HECKER, **Administrative Patent Judge**.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1, 2, 3, 6 through 19, 22 and 24 through 30, all of the claims pending in the present application.

¹Application for patent filed June 10, 1994.

The invention relates to an apparatus, such as an optical encoder, for optical measurement of a displacement of a moving body. In particular, referring to Figure 12, a light source 11 and a collimator lens 12 illuminate a fixed diffraction plate 13. Diffracted light from plate 13 passes through movable diffraction plate 14 which has the same grating pitch as plate 13. The step difference "d" of the height between tops and bottoms of the gratings of the fixed and movable diffraction plates 13 and 14 is related to the wavelength λ . A condenser lens 15 condenses light transmitted through the movable diffraction plate 14 onto photosensor 16. The movable diffraction plate 14 is usually fixed to a body to be measured (not shown) and moves in the same way as the body to be measured. A feature of the invention is that the entrance pupil of the condenser lens 15 is limited to be within $D - 2g\lambda/p$ where "D" is the size of the beam collimated by the collimator lens 12, "g" is a distance between the fixed diffraction plate 13 and the movable diffraction plate 14, λ is the wavelength of the light and "p" is the pitch of the gratings formed on the diffraction plates. The distance "g" between the diffraction plates is set to satisfy the

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inequality $g < pD/(28)$.

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Representative independent claims 1 is reproduced
as follows:

1. An apparatus for measuring a displacement of a
moving body comprising:

a light source for providing a coherent collimated
beam of wavelength λ and diameter "D";

a fixed diffraction plate and a movable diffraction
plate each comprising a grating of pitch "p", said grating
having main diffraction components of orders ± 1 , said fixed
and movable diffraction plates being arranged in parallel to
each other with a distance "g" between them, said plates being
provided in an optical path of the collimated beam so as to be
perpendicular to an optical axis of the collimated beam so
that the collimated beam is diffracted by the gratings in the
fixed and movable diffraction plates successively; and

an optical detector for detecting an amount of a
light substantially caused by interference of diffraction
components of orders ± 1 , said diffraction components being
generated by the successive diffraction by the first and
second diffraction plates, said optical detector comprising a
condenser lens and a photosensor, said condenser lens having
an entrance pupil size which is within $D - 2g\lambda/p$, wherein said
condenser lens condenses the light transmitted through said
fixed and movable diffraction plates, and said photosensor
detecting light condensed by said condenser lens;

whereby a displacement of the movable diffraction
plate can be detected from the detected amount of light.

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The Examiner relies on the following references:

Barber et al. (Barber)	3,153,111	Oct. 13, 1964
Weyrauch	3,586,665	June 22, 1971
Muraoka et al. (Muraoka)	4,650,332	Mar. 17, 1987
Spies	4,792,678	Dec. 20, 1988
Huggins	4,964,727	Oct. 23, 1990
Ichikawa et al. (Ichikawa)	4,983,825	Jan. 8, 1991
Ikeuchi	5,030,825	Jul. 9, 1991
McMurtry et al. (McMurtry)	5,064,290	Nov. 12, 1991
Katayama	5,194,919	Mar. 16, 1993

Claims 1, 2, 3, 6, 8, 9 and 26 through 30 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Barber.²

Claim 7 stands rejected under 35 U.S.C. § 103 as being unpatentable over Barber in view of Huggins.

Claims 10 through 14 stand rejected under 35 U.S.C. § 103 as being unpatentable over Weyrauch in view of Barber.

Claim 15 stands rejected under 35 U.S.C. § 103 as being unpatentable over Spies in view of McMurtry.

Claims 16 through 19 stand rejected under 35 U.S.C. § 103 as being unpatentable over Ikeuchi in view of Katayama

²On page 4 of the answer the Examiner indicates that the 35 U.S.C. § 112, paragraph 2, rejection of claims 1 through 3 has been overcome.

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in further view of Muraoka and Ichikawa.

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Claims 22, 24 and 25 stand rejected under 35 U.S.C. § 103 as being unpatentable over Ikeuchi in view of Katayama in further view of Muraoka and Ichikawa and further view of Barber. Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the brief and answer for the respective details thereof.

OPINION

We will not sustain the rejection of claims 1, 2, 3, 6, 8, 9 and 26 through 30 under 35 U.S.C. § 102(b), nor the rejection of claims 7, 10 through 19, 22, 24 and 25 under 35 U.S.C. § 103.

The Examiner has failed to set forth a **prima facie** case. It is the burden of the Examiner to establish why one having ordinary skill in the art would have been led to the claimed invention by the reasonable teachings or suggestions found in the prior art, or by a reasonable inference to the artisan contained in such teachings or suggestions. **In re Sernaker**, 702 F.2d 989, 995, 217 USPQ 1, 6 (Fed. Cir. 1983). "Additionally, when determining obviousness, the claimed invention should be considered as a whole; there is no legally

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recognizable 'heart' of the invention." *Para-Ordnance Mfg. v. SGS Importers Int'l, Inc.*, 73 F.3d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995) (*citing W. L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1548, 220 USPQ 303, 309 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984)).

With regard to the rejection of claims 1, 2, 3, 6, 8, 9 and 26 through 30 under 35 U.S.C. § 102(b) as being anticipated by Barber, Appellants argue:

The Examiner has ignored the specifically recited sizes and distances and various interrelationships and angles in the case of claim 6 by merely stating:

"Inherently the condenser in Figure 1 can be of any size and the detector in Fig. 2 can be at any distance." (Emphasis added)

While the Examiner is clearly correct in that the condenser can be of any size and the detector can be at any distance, the present specification discloses particular [sic] advantages which occur when the sizes and distances and interrelationships are chosen in accordance with the recited limitations of the rejected claims. (Emphasis added, brief at page 13.)

Looking at the claims we see the following recited limitations of the rejected claims: "said condenser lens

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having an entrance pupil size which is within $D-2g/p$ " recited in claim 1, "said beam having an angle θ relative to a normal to said movable diffraction plate so that $\sin(\theta)=\pm g/p$ " recited in claim 6, and "said optical detector comprises a photosensor arranged at a position distant from the fixed and movable diffraction plates by $D/2g$ or more in a region which is within $D-2g/p$ around the optical axis" recited in claim 26.

The Examiner responds that Appellants' argument is based on "intended results", not positive limitations. We do not agree, the claim limitations noted above are clearly positive limitations. The Examiner responds further:

The examiner has used a[n] inherent statement, not an obviousness statement, therefore an obvious argument is irrelevant. Secondly, the examiner feels that a skilled artisan would find this inherent in the reference and the applicant has failed to prove, with evidence and not conclusionary statements, that this is an unexpected result since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. (Answer at pages 4 and 5.)

We do not agree with the Examiner on both counts. First, if the prior art reference does not expressly set forth a particular element of the claim, that reference still may

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anticipate if that element is "inherent" in its disclosure. To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill."

Continental Can Co. v. Monsanto Co. 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *Id.* at 1269, 20 USPQ2d at 1749 (quoting *In re Oelrich*, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981)). The Examiner has offered no evidence whatsoever that Barber inherently contains the claimed limitations. And, without Appellants' disclosure, the recited claim limitations are considered mere probabilities or possibilities with respect to Barber.

Secondly, "discovering an optimum value" is an obviousness argument, which is also unsupported by any evidence that the claimed limitations are recognized result effective variables. We are not inclined to dispense with

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proof by evidence when the proposition at issue is not supported by a teaching in a prior art reference, common knowledge or unquestionable demonstration. Our reviewing court requires this evidence in order to establish a **prima facie** case. *In re Knapp-Monarch Co.*, 296 F.2d 230, 232, 132 USPQ 6, 8 (CCPA 1961); *In re Cofer*, 354 F.2d 664, 668, 148 USPQ 268, 271-72 (CCPA 1966).

Thus, we will not sustain the 35 U.S.C. § 102(b) rejection of independent claims 1, 6 and 26, and likewise the rejection of claims 2, 3, 8³, 9 and 27 through 30 which depend therefrom and contain the same limitations.

The Examiner has rejected claim 7 under 35 U.S.C. § 103 as unpatentable over Barber in view of Huggins. Huggins is applied for its teachings regarding prisms. However, Huggins does not supply the claim 6 limitation missing in Barber (i.e., "said beam having an angle **2** relative to a normal to said movable diffraction plate so that $\sin(\mathbf{2})=\pm\mathbf{8}/p$ ") as noted **supra**. Thus claim 7, which contains this limitation

³It is noted that claims 8 and 9 are the same as claims 29 and 30 except for the word "collimated" which does not appear to have an antecedent basis.

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via its dependency from claim 6, is not met by the references and we will not sustain the rejection of this claim.

With regard to the rejection of claims 10 through 14 under 35 U.S.C. § 103 as being unpatentable over Weyrauch in view of Barber, Appellants argue:

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[N]either Barber et al. nor Weyrauch teach or suggest the specifically recited relationships of claim 10 with regard to the angle of the beam relative to a normal to the rotary plate and depending upon the wavelength of the light source and the pitch of the rotary plate.... (Brief at page 15.)

Looking at claim 10 we see, "said beam having an angle θ relative to a normal to said rotary plate so that $\sin(\theta) = \pm \lambda/p$ ". The Examiner responds with the same explanation used with respect to Barber as applied to claims 1, 6 and 26, i.e.,

The examiner has used a[n] inherent statement, not an obviousness statement, therefore an obvious argument is irrelevant. Secondly, the examiner feels that a skilled artisan would find this inherent in the reference and the applicant has failed to prove, with evidence and not conclusionary statements, that this is an unexpected result since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. (Answer at pages 4 and 5 referred back to at page 6.)

As discussed above, we do not find any evidence that the claimed beam angle is inherent or the subject of mere optimization in Barber. This deficiency is not cured by

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Weyrauch. The Examiner has not alleged the claimed beam angle can be found or is suggested by Weyrauch; nor can we find such in Weyrauch. Thus, we will not sustain the 35 U.S.C. § 103 rejection of claim 10, and likewise claims 11 through 14 which depend therefrom and thereby contain the same beam angle limitation.

With regard to the rejection of claim 15 under 35 U.S.C. § 103 as being unpatentable over Spies in view of McMurtry, Appellants argue:

The Examiner then correctly admits that the light [of Spies] does not pass the first, the second, the third, and the second grating successively (as recited in claim 15).

The Examiner then argues that McMurtry et al. teaches the ability to arrange multiple fixed gratings and a movable grating in any order and still attain "the same results".

Applicants disagree in that McMurtry et al. merely discloses that one can reverse the order of the gratings and produce an operative system but does not teach or suggest that the resultant systems are equivalent in operation or necessarily produce the identical result. (Brief at pages 16 and 17.)

The Examiner cites McMurtry, and specifically column

6, lines 11-44, as teaching that the gratings can be placed in any order and the same results will be attained. (Answer at page 7.) We agree with Appellants. McMurtry states (col. 6, lines 17-21): "Where the order of the first, second and third gratings is 12, 11, 13, the grating 14 may be situated anywhere in the light path between the gratings 12, 13 but it is advantageous for the grating 14 to be situated close to the one or the another of the gratings 12, 13 because...."

McMurtry also states (col. 6, lines 27-36): "When the grating 14 is situated upbeam of the scale 11, the secondary orders are generated before the primary orders... It is nonetheless preferable to generate the secondary orders after the light is incident upon the scale [11]." (Emphasis added.)

Thus, although McMurtry's grating 14 may be moved, we fail to see a teaching that "any order" of the gratings is acceptable while "still attaining the same results" as alleged by the Examiner. Other features of McMurtry lead away from its use to modify Spies. McMurtry uses secondary orders of diffraction (column 1, lines 61-63) as opposed to claim 15's recited "first orders of diffraction"; McMurtry may use (and appears to use) non-coherent light (column 2, line 35) and

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only uses coherent light in the eighth example (column 6, lines 45 and 46) as opposed to claim 15's recitation of a coherent collimated beam; and McMurtry passes the light beam only once through a moving grating (11) while claim 15 recites a beam path that passes through a moving

grating twice (entering and exiting the rotary cylinder which comprises a second grating). Thus, we will not sustain the 35 U.S.C. § 103 rejection of claim 15.

With regard to the 35 U.S.C. § 103 rejection of claims 16 through 19 as unpatentable over Ikeuchi in view of Katayama in further view of Muraoka and Ichikawa, Appellants argue:

[I]t is noted that the Examiner alleges that it would be obvious to incorporate a condensing means, either a Fresnel lens or a condensing lens, into the aperture of the above references or in place of the filter because "a condensing lens is a well known device to accurately direct light to a particular point, i.e. a detector area and the use of a condensing means on the movable object would help make the measurements for position more accurate by making sure all the light which hits the area is directed to a point on the

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detectors as the movable body moves".

It is agreed that a condensing lens is a well known device but the Examiner has utilized hindsight based on the present specification to reach the conclusion that the use of a condensing means would help make the measurements for position more accurate since such a conclusion is neither taught nor suggested in any of the cited references. (Brief at page 18.)

Looking at claim 16 we see the claimed condensing lens recited as "a first condenser which is attached to the movable body, said first condenser condensing the collimated beam;".

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The Examiner responds:

[T]he examiner was paraphrasing numerous reference[s] in the optical measuring and testing arts [as] motivation for having a lens. The use of a lens and the placement of a lens in a system for focusing light onto a detector is conventional and obvious. The appellant is reminded that motivation for combining references need not be explicitly found in references themselves, and the examiner may provide [an] explanation **based on logic and sound scientific reasoning** that will support a holding of obviousness. Also, that the test for obviousness under 35 USC § 103 is what the combined teachings of the applied references, when taken as a whole, would have suggested to one of ordinary skill in the art. (Underlining added) (Answer at pages 7 and 8.)

The Federal Circuit states that "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." ***In re Fritch***, 972 F.2d 1260, 1266 n.14, 23 USPQ2d 1780, 1783-84 n.14 (Fed. Cir. 1992), ***citing In re Gordon***, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). "Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor." ***Para-Ordnance Mfg. v. SGS***

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Importers Int'l, 73 F.3d at 1087, 37 USPQ2d at 1239, **citing** *W. L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d at 1551, 1553, 220 USPQ at 311, 312-13.

We find nothing in any of the applied references teaching or suggesting the use of a condenser on the movable body. The closest teachings relate to slits or apertures/filters, e.g., element 9 in Ikeuchi, element 21 in Katayama. Not only has the Examiner used his "logic and scientific reasoning" (not references) to come up with a condenser, he has extended this logic, etc., to place the condenser on the movable body. We agree with Appellants, the only motivation evidenced of record is that of hindsight. Thus, we will not sustain the rejection of independent claim 16, and likewise claims 17 through 19 which depend therefrom and include the same limitation.

Turning to the rejection of claims 22, 24 and 25 under 35 U.S.C. § 103, the Examiner has applied the same references as applied against claims 16 through 19, with the addition of Barber. Claims 22, 24 and 25 are dependent claims which depend from claim 16. Since Barber also does not teach

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or suggest placing a condenser on the movable body, we will not sustain the rejection of claims 22, 24 and 25 for the same reasons discussed with regard to claim 16.

We have not sustained the rejection of claims 1, 2, 3, 6, 8, 9 and 26 through 30 under 35 U.S.C. § 102(b), nor the rejection of claims 7, 10 through 19, 22, 24 and 25 under 35 U.S.C. § 103. Accordingly, the Examiner's decision is reversed.

REVERSED

KENNETH W. HAIRSTON)	
Administrative Patent Judge))	
)	
)	BOARD OF PATENT
)	APPEALS AND
LEE E. BARRETT)	INTERFERENCES
Administrative Patent Judge))	
)	
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STUART N. HECKER)	
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