

The opinion in support of the decision being entered today was not written for publication in a law journal and is not binding precedent of the Board.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 ALLAN C. CHEUNG, SCOTT M. HEYDINGER, and SHAUN T. LOVE

Appeal No. 1998-1902
Application No. 08/435,592

ON BRIEF

Before THOMAS, FLEMING, 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.

We reverse.

BACKGROUND

The disclosed invention is directed to a method for diffusing quantization error that is inherent in converting a continuous tone (gray scale) scan to binary values. The binary values represent what is to be printed by a printer as black dots, and what is not to be printed (i.e., leaving white space). The printer cannot print shades of gray, so the error diffusion filter enables simulation of the scanned continuous image using the binary printed output. Claim 1 is reproduced below.

1. An error diffusion method for halftoning a digital image formed of an array of scan lines of pixels, each pixel having a gray value, for forming an output image including:

scanning each line of image pixels in a processing direction from one end of the scan line to the other;

determining the gray value of each image pixel; and

error diffusing each of the image pixels by using an error diffusion filter having weights of 8 - 0 - 4 - 4 expressed in clockwise sequence from the origin.

The examiner relies on the following references:

Barton	5,313,287	May 17, 1994
Eschbach et al. (Eschbach)	5,317,653	May 31, 1994

Claims 1 and 2 stand rejected under 35 U.S.C. § 103 as being unpatentable over Barton and "the well known prior art."

Claims 3-12 stand rejected under 35 U.S.C. § 103 as being unpatentable over Barton, "the well known prior art," and Eschbach.

Appeal No. 1998-1902
Application No. 08/435,592

Claims 13-16 have been canceled, and claims 17-20 have been allowed.

We refer to the Final Rejection (Paper No. 6) and the Examiner's Answer (Paper No. 9) for a statement of the examiner's position and to the Brief (Paper No. 8) and the Reply Brief (Paper No. 10) for appellants' position with respect to the claims which stand rejected.

OPINION

According to the statement of the rejection with regard to claims 1 and 2, Barton is relied upon as disclosing a method similar to instant claim 1. (See Answer, page 4.) However, the reference "does not specifically show...a diffusion filter having weights 8 - 0 - 4 - 4 expressed clockwise from the origin." (Id.)

The examiner submits that the use of a filter which has a weight expressed as 8 - 0 - 4 - 4, is not critical to the invention and thus, would have been obvious as a matter of design choice. The prior art shows different weighting arrangements with respect to the Floyd and Steinberg methods. One of ordinary skill in the art would have known to substitute one type of weighted filter in place of another for the purpose of obtaining a desired error diffusion result.

(Id. at 4-5.)

Appellants' specification (at page 7) discusses Barton, the reference applied against claims 1 and 2. Appellants describe Barton's error diffusion filter as a "3-weight filter." As shown in Barton's Figures 5A and 5B, and described principally at lines 40-52 of column 7, Barton reduces error diffusion processing time "by nearly 25 percent." Barton

improves upon the Floyd and Steinberg filter (Fig. 5A) by changing the rightmost weights (7/16 and 1/16) to 8/16 and zero (Fig. 5B). Thus, in the terminology of instant claim 1, the Floyd and Steinberg filter has weights of 7 - 1 - 5 - 3 expressed in clockwise sequence from the origin (i.e., the black dot which represents the present pixel being scanned). Barton's filter may be expressed as having weights of 8 - 0 - 5 - 3 in clockwise sequence from the origin. Barton also makes reference to error diffusion filters having more terms than the four contained in the Floyd and Steinberg filter (see column 6, lines 13-19.)

However, we do not find any suggestion in Barton for the filter having weights of "8 - 0 - 4 - 4 expressed in clockwise sequence from the origin," as required by instant claim 1. Nor has the examiner presented any convincing rationale that shows the subject matter as a whole of claim 1 would have been prima facie obvious to the artisan.

We acknowledge that Barton, with reference to Figures 5A and 5B, teaches moving weight from the 1/16 (lower right) box to the 7/16 (upper right) box, such that the upper right box contains weight of 8/16, with the lower right box containing weight of zero. In retrospect, we also see that moving 1/16 of the weight in the 5/16 (lower center) box to the 3/16 (lower left) box of Figure 5B would result in the filter claimed -- 8 - 0 - 4 - 4. However, absent this impermissible hindsight, we fail to see, based on the evidence before us, how the artisan would have been led to select the claimed parameters.

Appellants' specification provides motivation for the departure from the prior art. As stated in the "Summary of the Invention," having "one of the weighted error terms twice

the magnitude of the other weighted error term, the present technique provides certain computational advantages.” (Specification, page 8, lines 11-13.) “Each of the two weights for the error terms is a multiple of 2 so that a shift in a binary shift register can be utilized to obtain each of the weighted terms.” (Id. at lines 14-16.)

As for the former stated advantage, Barton’s reduction of processing time “by nearly 25 percent” appears to refer to skipping one division operation with respect to each pixel, since one of the weighted terms becomes zero, or null. Barton does not disclose a “computational advantage” in having one of the weighted terms twice the magnitude of the other weighted term.

As for the latter stated advantage, Barton does not disclose details of the circuitry for performing the filter operations. The filter circuitry would appear to be substantially no different from that of the prior art, represented in Barton’s Figure 4 simply as the “Error Filter.” There was thus no recognition in the reference, and no suggestion, that using terms that are a power of two would result in faster and simpler operations, allowing use of simple binary shift registers to perform the required division, as shown in appellants’ Figure 1.

The vaguely-referenced “well known prior art” does not allege any particular knowledge within the understanding of the artisan, and does not serve to lead to any motivation for arriving at the subject matter of instant claim 1. While we agree that the artisan would have been expected to seek to improve upon, and likely change, the filter

Appeal No. 1998-1902
Application No. 08/435,592

disclosed by Barton, the evidence does not support the view that the requirements of instant claim 1 would have been prima facie obvious to the artisan.

The examiner's argument that the "8 - 0 - 4 - 4" weighting scheme has not been shown to be critical is not well taken. We have pointed out one occurrence in the specification which provides reasons for the claimed weights. In addition, as appellants point out in the Brief, the instant specification is replete with sections consistent with the criticality of the particular weighting scheme claimed.

The examiner also alleges, as stated on page 11 of the Answer, that the claimed weighting scheme is not critical because the numbers "8 - 0 - 4 - 4" are not used in the specification's disclosed filter algorithm. However, as appellants point out in the Reply Brief at pages 2-3, the original disclosure, which included the Abstract and the original claims, referred to the filter as having "8 - 0 - 4 - 4" weighting. We find it of no significance that appellants have chosen to use the terms "8 - 0 - 4 - 4" in the claims, rather than, for example, using fractions as shown in instant Figure 2. We consider the claims to set forth appellants' invention in clear terms, in light of the specification, and the examiner has not submitted any rejection for indefiniteness under 35 U.S.C. § 112, second paragraph. Expressing the filter parameters in different ways does not mean that the parameters are not critical to the invention.

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

Appeal No. 1998-1902
Application No. 08/435,592

1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984) (citing In re Warner, 379 F.2d 1011, 1016, 154 USPQ 173, 177 (CCPA 1967)). The one who bears the initial burden of presenting a prima facie case of unpatentability is the examiner. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). We conclude that the evidence provided in the instant case is insufficient to support the rejection of claims 1 and 2, and therefore do not sustain the rejection.

With respect to the rejection of claims 3-8, for which Eschbach is added to Barton and “the well known prior art,” the Eschbach reference fails to provide the basic teachings that we find to be missing from Barton. As the examiner correctly notes, Figure 3B of Eschbach discloses a filter weighting arrangement that has three terms and two weights, as required by instant claim 3. However, claim 3 requires the precise weights of “8 - 0 - 4 - 4,” and Eschbach, as Barton, fails to provide any reasons for leading the artisan to the claimed weighting scheme. We therefore do not sustain the section 103 rejection of claims 3-12.

CONCLUSION

The rejection of claims 1-12 is reversed.

Appeal No. 1998-1902
Application No. 08/435,592

REVERSED

JAMES D. THOMAS
Administrative Patent Judge

MICHAEL R. FLEMING
Administrative Patent Judge

HOWARD B. BLANKENSHIP
Administrative Patent Judge

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Appeal No. 1998-1902
Application No. 08/435,592

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