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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte HONG JIANG, KIM N. MATTHEWS, ZULFIQUAR SAYEED, PAUL A. WILFORD, and LESLEY J. WU

Appeal 2015-006095
Application 12/652,390
Technology Center 2600

Before JOHN F. HORVATH, ADAM J. PYONIN, and MICHAEL M. BARRY, *Administrative Patent Judges*.

Opinion for the Board filed by *Administrative Patent Judge* PYONIN.

Opinion Dissenting-in-Part filed by *Administrative Patent Judge* HORVATH.

PYONIN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) from a Non-Final Rejection of claims 1–4, 6–15, and 20–22.[1] We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

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[1] Claims 5 and 17–19 have been objected to for being dependent upon a rejected base claim, and claim 16 has been allowed. *See* Non-Final Act. 13.

STATEMENT OF THE CASE

Introduction

Appellants' disclosure is directed to "the field of signal processing, and more particularly . . . to multiple description coding of signals for transmission over a communication network or other type of communication medium." Spec. 1:4–6. Claim 1 is reproduced below for reference:

> 1. An apparatus comprising:
>
> a multiple description encoder, the encoder comprising:
>
> orthogonal multiple description generation circuitry configured to produce multiple descriptions of a given signal by processing the signal using respective ones of a plurality of orthogonal matrices;
>
> wherein each of the multiple descriptions is generated as a function of said signal and a corresponding one of the plurality of orthogonal matrices; and
>
> wherein the signal comprises a vector of dimension N and the plurality of orthogonal matrices comprise orthogonal matrices of dimension N x N.

References and Rejections

Claims 1–4, 6–9, 12–15, and 20–22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Goyal (US 6,330,370 B2; Dec. 11, 2001) and Chang (US 2010/0177842 A1; July 15, 2010). Final Act. 3.

Claim 10 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Goyal, Chang, and Ragot (US 2010/0121646 A1; May 13, 2010). Final Act. 12.

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Goyal, Chang, Ragot, and Onggosanusi (US 2003/0016640 A1; Jan. 23, 2003). Final Act. 12.

ANALYSIS

Appellants argue the Examiner's "rejection of claim 1 is in error as the collective teachings of Goyal and Chang fail to disclose all of the features of claim 1." App. Br. 4. Particularly, Appellants contend

> [c]laim 1 [] recites that the signal comprises a vector of dimension N and the plurality of orthogonal matrices comprise orthogonal matrices of dimension N x N. In the Office Action at page 4, last paragraph, the Examiner concedes that Goyal fails to disclose these features and cites to Chang as remedying the admitted deficiencies of Goyal.

App. Br. 6. Appellants argue that, "Chang, however, does not disclose processing a signal (comprising a vector of dimension N) using respective ones of a plurality of orthogonal matrices of dimension N x N. Instead, Chang describes extracting a row or column vector from an orthogonal matrix for use in generating a codeword." *Id.*

We are persuaded by Appellants' arguments. Goyal does not teach the claimed generating descriptions as a function of a signal (of dimension N) and a plurality of orthogonal matrices (each of dimension N x N). Final Act. 4. The Examiner finds Chang teaches the disputed limitations, because "Chang discloses a basic codeword, [a] basic codeword means data symbols generated by using conventional channel coding," and the "data symbols are elements of a mapping vector obtained by extracting a row of a simplex code generated by removing a single row or column of an orthogonal matrix." Ans. 17 (citing Chang ¶¶ 27, 53, 57–60).

Although we agree with the Examiner that Chang discloses obtaining codewords by using orthogonal matrices of dimension N x N (Chang ¶ 60), we find Chang does not teach or suggest *applying* these matrices to an input signal *comprising a vector of dimension N*, as claimed. We, therefore, agree

with Appellants that "Chang fails to remedy the admitted deficiencies of Goyal." App. Br. 6. Accordingly, we are persuaded the Examiner erred in rejecting independent claim 1, and independent claims 13, 15, and 21 which recite similar limitations. *See* App. Br. 7.[2] We do not sustain the Examiner's rejection of these claims, or the claims dependent thereon.

DECISION

The Examiner's rejection of claims 1–4, 6–15, and 20–22 is reversed.

REVERSED

[2] Appellants present additional arguments. *See* App. Br. 4–12. As we find the argument discussed herein persuasive, we do not reach these additional arguments.

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HORVATH, *Administrative Patent Judge,* Dissenting-in-Part.

I respectfully dissent from the Majority's decision to reverse the Examiner's rejection of claims 1, 3, 6–8, 10–15, and 20–22.

Regarding claim 1, Appellants argue the Examiner erred because the combination of Goyal and Chang fails to teach or suggest producing multiple descriptions of a given N-dimensional signal by processing the signal using respective ones of a plurality of N x N orthogonal matrices. *See* App. Br. 4–7. In particular, Appellants argue that Chang, cited by the Examiner for using N x N orthogonal matrices to produce the M descriptions of Goyal's N-dimensional input signal:

> [D]oes not disclose processing a signal (comprising a vector of dimension N) using respective ones of a plurality of orthogonal

> matrices of dimension *N x N*. Instead, Chang describes extracting a row or column vector from an orthogonal matrix for use in generating a codeword.

App. Br. 6.

The Majority, although agreeing with the Examiner that Chang discloses using orthogonal N x N matrices to obtain codewords, "find[s] Chang does not teach or suggest *applying* these matrices to an input signal *comprising a vector of dimension N*, as claimed." Dec. 3. I respectfully disagree.

During prosecution, claims are to be given their broadest reasonable interpretation consistent with the specification. *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). The Specification teaches "generat[ing] *M* descriptions $y^{(i)}$ of a vector *x* by applying respective ones of the orthogonal matrices to the vector *x*," where the term "applying" should be "construed broadly so as to encompass multiplication by the matrix . . . *or other processing that utilizes the matrix*." Spec. 2:19–27 (emphasis added). The Specification does not describe what other processing might be done to vector *x* utilizing an orthogonal matrix. Significantly, however, it does not prohibit processing vector *x* by utilizing the extracted rows and columns of an orthogonal matrix. Therefore, the broadest reasonable interpretation of the term "processing the signal using respective ones of a plurality of orthogonal matrices," as recited in claim 1, *does not require multiplying the signal by each of the plurality of orthogonal matrixes, and does not preclude processing the signal by mapping it to the extracted rows and columns of a plurality of orthogonal matrices*. This interpretation is consistent with claim 2, which depends from claim 1, and *does require* processing the signal by

"*multiplying said signal by respective ones of the plurality of orthogonal matrices*." App. Br. 14 (claims 1 & 2).

Chang teaches generating codewords to represent an input signal by using "rows (or columns) of an orthogonal matrix as a mapping vector and mapping the mapping vector to at least one information bit." Chang ¶ 53. Chang teaches the rows or columns that are mapped to the input signal are extracted from different types of orthogonal matrices, such as DFT and Hadamard matrices. *Id.* ¶ 52. Thus, I agree with the Examiner that under a broad, but reasonable interpretation, the combined teachings of Goyal and Chang teach or suggest "produc[ing] multiple descriptions of a given signal by processing the signal using respective ones of a plurality of orthogonal matrices," as recited in claim 1. Accordingly, I would affirm the Examiner's rejection of claim 1, and of claims 7, 8, 10–15, and 20–22, which Appellants do not separately argue. *See* App. Br. 7, 12.

Regarding claim 3, Appellants' argue "Goyal appears to teach away from the use of orthogonal linear transforms by explicitly stating that 'discrete transforms derived from <u>nonorthogonal linear transforms</u>' are used for improved performance." App. Br. 8. I do not find Appellants' argument persuasive, and would therefore affirm the Examiner's rejection of claim 3.

A reference teaches away when it criticizes, discredits, or otherwise discourages a proposed solution. *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). Goyal does not criticize, discredit, or discourage the use of orthogonal transforms. Rather, Goyal teaches an advantage to be had by using nonorthogonal transforms. In particular, using *permissive rather than mandatory language*, Goyal teaches that quantizing (i.e., digitizing) and applying a discrete transform to the input signal "*permits* the use of discrete

transforms derived from nonorthogonal linear transforms, resulting in improved performance." Goyal 6:25–36 (emphasis added). Goyal, however, does not teach that applying an orthogonal transform to the input signal is *prohibited or would not work*. Accordingly, I would sustain the Examiner's rejection of claim 3.

Regarding claim 6, which depends from claim 3, the Examiner finds it recites a mathematical process (i.e., Gram-Schmidt orthogonalization) that is admittedly prior knowledge. Ans. 24 (citing Spec. 9:18–10:2). Appellants argue the portions of the Specification cited by the Examiner are not admitted prior art because they do not appear in the background section. I do not find Appellants' argument persuasive, and would sustain the Examiner's rejection of claim 6.

As Appellants' admit in their Specification, the Gram-Schmidt orthogonalization process is notoriously well-known, and allows any set of vectors of dimension N to be converted into a set of orthonormal vectors, which, when made the columns of a matrix, form an orthogonal matrix of dimension N x N. *See* Gilbert Strang, Linear Algebra and Its Applications, 126, 129 (2nd ed. 1980). Accordingly, I would sustain the Examiner's rejection of claim 6.

Regarding claim 11, Appellants' argue the Examiner erred because "Onggosanusi does not appear to disclose serialization circuitry, and thus cannot be said to disclose interleaving multiple descriptions <u>in conjunction with</u> serialization of the multiple descriptions in the manner recited in claim 11." App. Br. 12. I do not find Appellants' argument persuasive, and would therefore affirm the Examiner's rejection of claim 11.

"Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references." *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). The Examiner finds Ragot teaches serialization circuitry, *see* Final Act. 13, and Appellants' argument does not address this finding. Accordingly, I would affirm the Examiner's rejection of claim 11.

Regarding claims 2, 4, and 9, these claims all require processing the input signal (i.e., an N-dimensional vector x) by multiplying the input signal by each of a plurality of N x N orthogonal matrices. *See* App. Br. 14–15 (Claims App'x). I agree with Appellants' and the Majority that neither Goyal, Chang, nor the combined teachings of Goyal and Change teach or suggest doing so. Accordingly, I would reverse the Examiner's rejection of claims 2, 4, and 9 for the reasons stated in the Majority decision and Appellants' Brief at pages 8–11.