UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/113,733	04/25/2005	Bo Zhang	106861-0598	9664

121312 7590 11/10/2016

Foley & Lardner LLP/ Broadcom Corporation
3000 K Street N.W
Suite 600
Washington, DC 20007-5109

EXAMINER	
VO, TUNG T	

ART UNIT	PAPER NUMBER
2486	

NOTIFICATION DATE	DELIVERY MODE
11/10/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ipdocketing@foley.com
cmckenna@foley.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BO ZHANG, STEPHEN GORDON, and ANDREW ADAMS

Appeal 2014-005400
Application 11/113,733
Technology Center 2400

Before KALYAN K. DESHPANDE, DAVID M. KOHUT, and JUSTIN T. ARBES, *Administrative Patent Judges*.

ARBES, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's final rejection of claims 1–17 and 22–25, the only claims pending in the application on appeal. Claims 18–21 were cancelled previously. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).[1]

We AFFIRM-IN-PART.

---

[1] Our decision will make reference to Appellants' Appeal Brief ("Br.," filed September 19, 2011), and the Examiner's Answer ("Ans.," mailed November 1, 2011), Final Office Action ("Final Act.," mailed April 21, 2011), and Non-Final Office Action ("Non-Final Act.," mailed December 10, 2010).

INVENTION

Appellants' invention is directed to methods and systems for encoding video data. Spec. ¶ 16. Claims 1 and 9 recite:

> 1. A method for video encoding a current block within a picture, said method comprising:
>
> encoding a picture, thereby producing a set of parameters that characterize the picture;
>
> classifying the picture based on the set of parameters, thereby producing a first picture classification; and
>
> encoding the picture according to the first picture classification, thereby producing a video output.
>
> 9. A system for video encoding, said system comprising:
>
> a coarse motion estimator for encoding a picture, thereby producing a set of parameters that characterize the picture;
>
> a classification engine for classifying the picture based on the set of parameters, thereby producing a first picture classification; and
>
> a fine motion predictor for encoding the picture according to the first picture classification, thereby producing a video output.

REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Gonzales	US 5,231,484	July 27, 1993
Hui	US 5,488,419	Jan. 30, 1996
Sethuraman	US 6,434,196 B1	Aug. 13, 2002

REJECTIONS[2]

Claims 1–17 and 22–25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Sethuraman. Final Act. 2; Ans. 5–9.

Claims 1–4, 9–11, 15, and 22–25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Hui. Final Act. 3; Ans. 9–10.

Claims 1–17 and 22–25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Gonzales. Final Act. 3; Ans. 12–16.

ISSUES

Appellants argue that the Examiner's rejections of claims 1–17 and 22–25 are in error. Br. 7–26. These arguments present us with the following issues:

(1) Did the Examiner err in finding that Sethuraman discloses a "coarse motion estimator for encoding a picture, thereby producing a set of parameters that characterize the picture," a "classification engine for classifying the picture based on the set of parameters," and a "fine motion predictor for encoding the picture according to the first picture classification," as recited in claim 9 and similarly recited in claim 1?

(2) Did the Examiner err in finding that Sethuraman discloses the limitation that "the set of parameters that characterize the picture results from the encoding of a future macroblock in the picture," as recited in claim 4?

---

[2] The Examiner's headings for the Sethuraman and Gonzales rejections in the Answer incorrectly state that claims 18–21 also are rejected. *See* Ans. 5, 12. Claims 18–21 were cancelled previously.

(3) Did the Examiner err in finding that Sethuraman discloses a "statistics collector for measuring spatial activity in the preprocessed picture," as recited in claim 12 and similarly recited in claim 5?

(4) Did the Examiner err in finding that Sethuraman discloses a "spatial predictor for predicting spatial activity in the picture," as recited in claim 14 and similarly recited in claim 7?

(5) Did the Examiner err in finding that Hui discloses producing "parameters" and a "fine motion predictor for encoding the picture according to the first picture classification," as recited in claim 9 and similarly recited in claim 1?

(6) Did the Examiner err in finding that Hui discloses the limitation that "the set of parameters that characterize the picture results from the encoding of a future macroblock in the picture," as recited in claim 4?

(7) Did the Examiner err in finding that Hui discloses the limitation that "the coarse motion estimator motion estimates the picture from the original lossless previous pictures," as recited in claim 22?

(8) Did the Examiner err in finding that Gonzales discloses the limitation that "the set of parameters that characterize the picture results from the encoding of a future macroblock in the picture," as recited in claim 4?

(9) Did the Examiner err in finding that Gonzales discloses a "spatial predictor for predicting spatial activity in the picture," as recited in claim 14 and similarly recited in claim 7?

ANALYSIS

I. Sethuraman Rejection

Claims 1–3, 8–11, and 15–17

Independent claim 9 recites a system for video encoding comprising "a coarse motion estimator for encoding a picture, thereby producing a set of parameters that characterize the picture," "a classification engine for classifying the picture based on the set of parameters, thereby producing a first picture classification," and "a fine motion predictor for encoding the picture according to the first picture classification, thereby producing a video output." Thus, the classification engine is dependent on the parameters produced by the coarse motion estimator (classifying the picture "based on the set of parameters"), and the fine motion predictor is dependent on the first picture classification produced by the classification engine (encoding the picture "according to the first picture classification"). The fine motion predictor, therefore, ultimately is dependent on the coarse motion estimator. Independent claim 1 recites similar limitations.

Appellants argue that the Examiner erred in finding that Sethuraman anticipates claims 1 and 9 because the progression of steps in Sethuraman's video encoding process differs from the order recited in the claims. Br. 7–10. Specifically, Appellants contend that the Examiner relies on motion compensation module 145 in Sethuraman as a "coarse motion estimator" and motion estimation module 150 as a "fine motion predictor," but motion compensation module 145 does not provide any output to motion estimation module 150; therefore, the alleged "fine motion predictor" is not dependent on the "coarse motion estimator," as required by the claims. *Id.* at 9. Appellants' argument is not persuasive because it mischaracterizes the findings of the Examiner. The Examiner finds that Sethuraman's motion estimation module 150 and full pel motion estimator 151—not motion compensation module 145—constitute a "coarse motion estimator" that produces a set of parameters, block classifier 102-4 constitutes a "classification engine" that classifies the picture based on the parameters, and motion compensation module 145—not motion estimation module 150—constitutes a "fine motion predictor" that encodes the picture according to its classification. *See* Ans. 5 (citing Sethuraman, Fig. 1), 30–31; Final Act. 2; Non-Final Act. 2–3.

Appellants also argue that the picture classification performed by block classifier 102-4 is not based on parameters provided by motion compensation module 145. Br. 9–10. Again, we are not persuaded of error, as the Examiner relies on motion estimation module 150 and full pel motion estimator 151—not compensation module 145—as a "coarse motion estimator." Specifically, the Examiner finds that Sethuraman "teaches a coarse motion estimator (150 and 151 of fig. 1) for producing a set of parameters (FPMV [full pel motion vectors], FPD [full pel distortion signals], HPMV [half pel motion vectors], and HPD [half pel distortion signals])" to be used by block classifier 102-4. Ans. 30–31 (citing Sethuraman, col. 7, ll. 21–56, Figs. 5, 6). Appellants do not explain sufficiently why that finding is in error.

Accordingly, we sustain the Examiner's rejection of independent claim 9, as well as independent claim 1, for which Appellants rely on their arguments regarding claim 9. *See* Br. 14. We also sustain the rejection of dependent claims 2, 3, 8, 10, 11, and 15–17, which Appellants do not argue separately.

Claim 4

Claim 1 recites "encoding a picture, thereby producing a set of parameters that characterize the picture." Claim 4, which depends from claim 1, recites that "the set of parameters that characterize the picture results from the encoding of a future macroblock in the picture." The Examiner finds that the motion compensation in Sethuraman "involves a prediction that uses motion vectors to provide offsets into the past and/or future reference frames containing previously decoded sample values that are used to form the prediction error," and "this clearly suggests the motion compensation encoding the future block as the previous decoded sample value in the future reference frame." Ans. 6, 34 (citing Sethuraman, col. 7, ll. 57–63, col. 8, ll. 12–15, Fig. 1).

Appellants argue that the phrase "future macroblock in the picture" excludes using macroblock motion vectors from other pictures; therefore, the Examiner erred in relying on motion vectors from past or future reference frames in Sethuraman. Br. 15. We agree with Appellants. Claim 4 recites that "the set of parameters that characterize the picture results from the encoding of a future macroblock in *the picture*" (emphasis added). As such, the parameters result from encoding a future macroblock in the same picture, not the encoding of other pictures, such as past or future reference frames. In the portion of Sethuraman cited by the Examiner, the reference discloses encoding past or future reference frames, rather than the encoding of a future macroblock in the same picture, as recited in claim 4. *See* Sethuraman, col. 7, ll. 57–63, col. 8, ll. 12–23. Accordingly, we do not sustain the Examiner's rejection of claim 4.

Claims 5, 6, 12, and 13

Claim 12 recites "a statistics collector for measuring spatial activity in the preprocessed picture." Claim 5 recites a similar limitation. The Examiner finds that Sethuraman's scene change detector 182 in first pre-processor 101 performs the same function of measuring the spatial activity of a preprocessed picture as the "statistics collector" that is claimed and described in the Specification. Ans. 7, 36 (citing Sethuraman, Figs. 1, 8, Spec. ¶ 34 ("The statistics collector 503 receives the preprocessed video data 417, measures spatial activity and field correlation, and detects a scene change.")). Specifically, scene change detector 182 "receives . . . processed video data . . . to measure the spatial activity and correlation (the differencing), and detects a scene change." *Id.* at 36.

Appellants argue that scene change detector 182 in Sethuraman does not collect statistics. Br. 18. Claim 5, however, only recites "measuring spatial activity in the preprocessed picture," and does not recite collecting statistics. Claim 12 recites a "statistics collector" that is "for measuring spatial activity in the preprocessed picture." The Examiner finds that a particular structure in Sethuraman—scene change detector 182—constitutes a statistics collector that receives processed video data and measures spatial activity in the preprocessed picture. Ans. 7, 36. Appellants do not explain sufficiently why that finding is incorrect, given that scene change detector 182 performs the same function recited in the claim and does so in a similar manner to what is described in the Specification.

Appellants also argue that scene change detector 182 "would have to operate[] by comparison of at least two frames," whereas the recited measuring is "in the preprocessed picture." Br. 18–19. We are not persuaded. The claims do not preclude the measurement of spatial activity in a preprocessed picture by comparing a preprocessed picture to other pictures. Sethuraman discloses comparing a preprocessed picture to other pictures to identify "information discontinuities, such as scene changes," between the pictures. Sethuraman, col. 4, ll. 13–29. The information discontinuities would be indicative of spatial activity within the preprocessed picture that led to the scene change. *See id.* Therefore, we agree with the Examiner's finding that Sethuraman discloses "a statistics collector for measuring spatial activity in the preprocessed picture," as recited in claim 12 and similarly recited in claim 5.

Accordingly, we sustain the Examiner's rejection of claims 5 and 12. We also sustain the rejection of claims 6 and 13, which depend from claims 5 and 12, respectively, and which Appellants do not argue separately.

Claims 7 and 14

Claim 14 recites "a spatial predictor for predicting spatial activity in the picture." Claim 7 recites a similar limitation. The Examiner finds that Sethuraman discloses motion prediction that "is inherently predict[ing] the spatial activity in the picture according [to the] MPEG standard," which is the same standard described in the Specification. Ans. 7, 37 (citing Sethuraman, Fig. 1, Spec. ¶¶ 4, 19). Appellants argue that spatial activity prediction, also referred to as "intra-prediction" in the Specification, involves the prediction of picture pixels from *neighboring* pixels, whereas Sethuraman's motion compensation involves motion prediction that uses motion vectors from past and/or future reference frames. Br. 20–22 (citing Sethuraman, col. 7, ll. 57–61, Spec. ¶ 38, Fig. 7). We agree with Appellants.

The Specification states that "[s]patial prediction, also referred to as intra prediction, involves prediction of picture pixels from neighboring pixels." Spec. ¶ 38, Fig. 7. The Specification does not describe the use of the MPEG standard to predict spatial activity in the picture. *See id.* ¶¶ 37–41. The Examiner does not explain sufficiently how Sethuraman's motion compensation inherently would use the MPEG standard to predict spatial activity in a picture through the prediction of picture pixels from neighboring pixels. Accordingly, we do not sustain the Examiner's rejection of claims 7 and 14.

Claims 22–25

As explained below, we sustain the rejection of claims 22–25 as being anticipated by Hui. Therefore, it is unnecessary for us to address the additional rejection of these claims based on Sethuraman. *See In re Hyon*, 679 F.3d 1363, 1367 (Fed. Cir. 2012) (not reaching an additional rejection of the claims at issue after upholding an obviousness rejection); *In re Gleave*, 560 F.3d 1331, 1338 (Fed. Cir. 2009) (not reaching an obviousness rejection after upholding an anticipation rejection); *In re Basell Poliolefine Italia S.P.A.*, 547 F.3d 1371, 1379 (Fed. Cir. 2008) (not reaching additional rejections after upholding an obviousness-type double patenting rejection); *Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984) (having decided a single dispositive issue, the ITC was not required to review other matters decided by the presiding officer).

II. Hui Rejection

Claims 1–3, 9–11, and 15

With respect to independent claim 9, the Examiner finds that Hui's full-pixel motion vector (MV) estimation circuit 3 constitutes a "coarse motion estimator" that produces a set of parameters (i.e., "full motion vectors"), horizontal motion detection circuit 11 and switch 25 constitute a "classification engine" that classifies the picture based on the parameters, and components 4–9 in Figure 3 of Hui constitute a "fine motion predictor" that encodes the picture based on its classification. Ans. 9, 31–33. Independent claim 1 recites similar limitations.

Appellants make two arguments. First, Appellants argue that Hui's full-pixel MV estimation circuit 3 provides "motion vectors and blocks," which do not constitute "parameters" produced by a coarse motion estimator "even given the broadest reasonable construction" of the term. Br. 12. We are not persuaded. Claims 1 and 9 recite the encoding of a picture to thereby produce a set of parameters that "characterize" the picture, but do not further limit what constitutes a "parameter." Appellants do not provide an interpretation for "parameter" or point to any language in the Specification defining the term. Indeed, the Specification merely refers to unspecified "[p]arameters 509" passed to classification engine 405. *See, e.g.*, Spec. ¶ 36, Figs. 4, 5. The Examiner finds that Hui's full motion vectors are parameters because they characterize the picture and are used by horizontal motion detection circuit 11 to classify the picture. *See* Ans. 9, 31–33 (citing Hui, Fig. 3). Hui discloses that motion vectors describe spatial activity of pixels within a picture. *See* Hui, col. 2, ll. 3–34. Appellants' bare assertion that the full motion vectors are not "parameters" is not sufficient to demonstrate error by the Examiner. *See* Br. 12.

Second, Appellants argue that Hui's horizontal motion detection circuit 11 "only selects the type of interlaced interpolation that is used," and the operation of components 4–9—the "fine motion predictor" according to the Examiner—is "not changed or affected in any way based on the type of interpolation that is used." *Id.* Appellants' argument is not persuasive because it fails to address the specific findings of the Examiner. The Examiner finds that Hui's motion compensation circuit 5 "perform[s] a fine motion prediction based on the half pixel motion vector estimation" provided by half-pixel MV estimation circuit 4 for encoding the picture according the picture classification (e.g., "frame based or field based blocks of [the] picture"). Ans. 32–33. Although horizontal motion detection circuit 11 selects the type of interpolation to be used, the half-pixel resolution blocks created by frame-based interpolation circuit 12 or field-based interpolation circuit 13 are provided to half-pixel MV estimation circuit 4. *See* Hui, col. 7, l. 22–col. 8, l. 19. Thus, we do not agree with Appellants that the operation of components 4–9 is not affected by the interpolation in Hui.

Accordingly, we sustain the Examiner's rejection of independent claim 9, as well as independent claim 1, for which Appellants rely on their arguments regarding claim 9. *See* Br. 14. We also sustain the rejection of dependent claims 2, 3, 10, 11, and 15, which Appellants do not argue separately.

Claim 4

Claim 4 recites that "the set of parameters that characterize the picture results from the encoding of a future macroblock in the picture." The Examiner finds that Hui discloses a "predictive-coded mode in which each frame is coded using motion compensation prediction from a *past* intra-coded or predictive-coded frame or/and a *future* intra-coded or predictive-coded frame includ[ing] a future macroblock." Ans. 9–10, 34–35 (emphasis added) (citing Hui, col. 1, ll. 34–49, Fig. 3). Similar to the rejection based on Sethuraman, Appellants argue that the Examiner erred in finding that Hui discloses the limitation of claim 4 because Hui performs prediction based on past and/or future reference frames, and does not disclose parameters that characterize the picture resulting from the encoding of a future macroblock in "the picture." Br. 15–16. We agree for the same reasons explained above regarding Sethuraman. Accordingly, we do not sustain the Examiner's rejection of claim 4.

Claims 22–25

Claim 9 recites "a coarse motion estimator for encoding a picture, thereby producing a set of parameters that characterize the picture." Claim 22, which depends from claim 9, recites the limitation that "the coarse motion estimator motion estimates the picture from the original lossless previous pictures." Appellants argue that rather than storing original lossless previous pictures for use by the coarse motion estimator, Hui discloses storing merged fields within reference frame memory 10. Br. 24–25.

We are not persuaded of error by the Examiner. The two field data of input interlaced video signal 17 in Hui are merged to form a merged interlaced field frame in current frame memory 1. *See* Hui, col. 5, l. 64–col. 6, l. 7, Fig. 3. The merged interlaced field frame is not lossy (i.e., lossless) because the interlaced field frames have not been compressed. *See id.* The incoming merged field frame is stored in reference frame memory 10 for later use during motion estimation. *Id.* at col. 5, l. 64–col. 6, l. 14, col. 7, ll. 5–21. As the Examiner finds, Hui discloses "original lossless previous pictures" because no compression is applied to the merged interlaced frames that are stored in reference frame memory 10 and used subsequently for coarse motion estimation. Ans. 42 (citing Hui, Fig. 3). We agree with the Examiner's findings because the interlaced merged picture is a previous picture made up of merged interlaced fields, and the interlaced fields that make up the previous picture have not been compressed. As such, we are not persuaded that the Examiner erred in finding that Hui discloses the limitation that "the coarse motion estimator motion estimates the picture from the original lossless previous pictures." Accordingly, we sustain the Examiner's rejection of claim 22. We also sustain the rejection of claims 23–25, which depend from claim 22 and which Appellants do not argue separately.

III. Gonzales Rejection

Claims 1–3, 5, 6, 8–13, 15–17, and 22–25

Having sustained the rejection of claims 1–3, 5, 6, 8–13, and 15–17 as being anticipated by Sethuraman, and sustained the rejection of claims 22–25 as being anticipated by Hui, it is unnecessary for us to address the additional rejection of these claims based on Gonzales. *See Hyon*, 679 F.3d at 1367; *Gleave*, 560 F.3d at 1338; *Basell Poliolefine*, 547 F.3d at 1379; *Beloit*, 742 F.2d at 1423.

Claim 4

Claim 4 recites that "the set of parameters that characterize the picture results from the encoding of a future macroblock in the picture." The Examiner finds that Gonzales discloses "interpolative motion compensation . . . in which the predictor is an average of a block from the *previous* predicting picture and a block from the *future* predicting picture." Ans. 13, 35 (emphasis added) (citing Gonzales, col. 5, ll. 13–20, Figs. 5, 6). Similar to the rejections based on Sethuraman and Hui, Appellants argue that the Examiner erred in finding that Gonzales discloses the limitation of claim 4 because Gonzales performs prediction based on past and/or future reference frames, and does not disclose parameters that characterize the picture resulting from the encoding of a future macroblock in "the picture." Br. 16–17. We agree for the same reasons explained above regarding Sethuraman and Hui. Accordingly, we do not sustain the Examiner's rejection of claim 4.

Claims 7 and 14

Claim 14 recites "a spatial predictor for predicting spatial activity in the picture." Claim 7 recites a similar limitation. The Examiner finds that Gonzales discloses the use of a motion estimation module to predict the spatial activity of a macroblock within a picture by predicting the motion of pixels within the macroblock using data from past and/or future reference frames, noting that "the difference between the spatial location of the [macroblock] and that of its predictor is referred to as a motion vector." Ans. 15, 38 (citing Gonzales, col. 4, l. 55–col. 5, l. 7, col. 16, ll. 34–35). Similar to the rejection based on Sethuraman, Appellants argue that spatial activity prediction involves the prediction of picture pixels from neighboring pixels, unlike Gonzales's process involving motion vectors from past and/or future references frames. Br. 22. We agree for the same reasons explained above regarding Sethuraman. Accordingly, we do not sustain the Examiner's rejection of claims 7 and 14.

CONCLUSION

Appellants have not persuaded us of error in the Examiner's decision to reject claims 1–3, 5, 6, 8–13, and 15–17 under 35 U.S.C. § 102(b) as being anticipated by Sethuraman.

Appellants have persuaded us of error in the Examiner's decision to reject claims 4, 7, and 14 under 35 U.S.C. § 102(b) as being anticipated by Sethuraman.

Appellants have not persuaded us of error in the Examiner's decision to reject claims 1–3, 9–11, 15, and 22–25 under 35 U.S.C. § 102(b) as being anticipated by Hui.

Appellants have persuaded us of error in the Examiner's decision to reject claim 4 under 35 U.S.C. § 102(b) as being anticipated by Hui.

Appellants have persuaded us of error in the Examiner's decision to reject claims 4, 7, and 14 under 35 U.S.C. § 102(b) as being anticipated by Gonzales.

DECISION

For the above reasons, the Examiner's decision to reject claims 1–3, 5, 6, 8–13, 15–17, and 22–25 is affirmed, and the Examiner's decision to reject claims 4, 7, and 14 is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART