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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/324,104	07/04/2014	Yan Li	LSLD-PM18035NDUS	2323

140931   7590   09/21/2020

FirstIPR
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ART UNIT	PAPER NUMBER
2483	

NOTIFICATION DATE	DELIVERY MODE
09/21/2020	ELECTRONIC

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PTOL-90A (Rev. 04/07)

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BEFORE THE PATENT TRIAL AND APPEAL BOARD
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Ex parte YAN LI, XIABO LIU, and JIALI CHENG
_____

Appeal 2019-003513
Application 14/324,104
Technology Center 2400
_____

Before ELENI MANTIS MERCADER, CARL L. SILVERMAN, and
MICHAEL T. CYGAN, *Administrative Patent Judges.*

CYGAN, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the
Examiner's decision to reject claims 1–12, 14, and 15, which are all of the
pending claims in the application. Appeal Br. 14–17 (Claims App.). We
have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] We use the word "Appellant" to refer to "applicant" as defined in
37 C.F.R. § 1.42.

REAL PARTY IN INTEREST

Appellant does not identify a real party in interest in either its Appeal Brief or its Reply Brief. Pursuant to 37 C.F.R. § 41.37(c)(1)(i) (2018), we assume that the named inventors are the real party in interest. We further note that Goodix Technology (HK) Company, Limited has been identified as the assignee of the entire right, title, and interest in the '104 application. Statement Under 37 C.F.R. 3.73(c), May 6, 2020.

CLAIMED SUBJECT MATTER

The claimed invention generally relates to deblocking filtering during video decoding. Spec. 1:5. In particular, it relates to deblocking for videos that have been encoded using deblocking within the prediction loop at the encoder. *Id.* at 1:5–7. For videos that have been encoded using the H.264 video standard, an H.264-conformant decoder cannot skip deblocking. *Id.* at 6:15–19. However, the inventors have recognized that "more significant blocking artefacts tend to occur in intra-coded blocks than inter-coded blocks," and thus it is advantageous to concentrate processing power on the intra-coded blocks rather than all of the block boundaries. *Id.* at 6:9–12.

Independent claim 1 is illustrative, with the limitation at issue on appeal emphasized in italics:

> 1. A method of decoding a video comprising a plurality of frames, each of which was encoded in a plurality of blocks of pixels, wherein an encoder used a predictive algorithm with deblocking inside a prediction loop, a first deblocking filter was applied by the encoder at boundaries between adjacent blocks, and an output of the first deblocking filter was used to provide a reference frame for the predictive algorithm, the decoding method comprising:

> reconstructing a frame of the video to produce a reconstructed frame;
>
> *applying a second deblocking filter macroblock by macroblock in raster-scan order only at boundaries between macroblocks for both luminance and chrominance components in the reconstructed frame*; and
>
> skipping deblocking-filtering at other block-boundaries m the reconstructed frame, even though deblocking was applied at those block-boundaries by the encoder.

Appeal Br. 13 (Claims App.).

Independent claim 9 recites a method of decoding a video in conformance with the H.264 standard, comprising limitations similar to those in claim 1. Appeal Br. 15 (Claims App.). Independent claim 14 recites a computer-readable medium having instructions for the method of claim 1, and independent claim 15 recites a video decoding apparatus comprising structure configured to perform the functions of claim 1. *Id.* at 16. Dependent claims 2–12, 14, and 15 each incorporate the limitations of claim 1. *Id.* at 13–17. Claim 13 was cancelled during prosecution. *Id.* at 16.

REFERENCES

Name	Reference	Date
He	US 2008/0137752 Al	June 12, 2008
Avadhanam et al. (Avadhanam)	US 2009/0304085 Al	Dec. 10, 2009
Ikeda	US 2014/0112396 Al	Apr. 24, 2014
Fu et al. (Fu)	US 2014/0328389 A1	Nov. 6, 2014

REJECTIONS

Claims 1–7, 9–12, 14, and 15 are rejected under 35 U.S.C. § 103 as being obvious over the combination of Avadhanam, He, and Ikeda.

Claim 8 is rejected under 35 U.S.C. § 103 as being obvious over the combination of Avadhanam, He, Ikeda, and Fu.

OPINION

We have reviewed the Examiner's obviousness rejections (Final Act. 5–9, Ans. 10–11) in light of Appellant's contentions that the Examiner has erred (Appeal Br. 6–10, Reply Br. 1–4). We are not persuaded by Appellant's contention of Examiner error in rejecting claims 1–7, 9–12, 14, and 15 under 35 U.S.C. § 103. We begin with claim 1.

Appellant contends that the Examiner errs in finding Ikeda teaches or suggests the claimed "applying a second deblocking filter macroblock by macroblock in raster-scan order only at boundaries between macroblocks for both luminance and chrominance components in the reconstructed frame." Appeal Br. 6.

The Examiner finds Ikeda teaches this limitation in the following manner:

> Fig. 2: deblocking filtering unit 24; Fig. 9: detailed deblocking filtering unit; 0183: the filter controller 246 includes a line boundary determining unit 2461. The line boundary determining unit 2461 determines whether a boundary is a line boundary (for example, inter-LCU line boundary) in respective block units in which the process is sequentially performed in a raster scan direction and outputs the determination results to the filter operation unit 245; 0168-9: Luminance Component Filtering; 0173: filtering of chrominance components.

Ans. 5. The Examiner further clarifies that Ikeda mentions a "First Embodiment of Deblocking Filtering Unit," that the filtering of boundaries is described in paragraph 183, and that deblocking is commonly known to sharpen the boundaries of blocks. Ans. 10.

Appellant argues that the Examiner has unreasonably broadened the claim language and cited Ikeda's deblocking filtering unit without addressing the "**macroblock by macroblock in raster-scan order only** at **boundaries** . . . for **both** . . . components." Appeal Br. 6. Appellant argues, "the claimed deblocking filter is applied at boundaries VLE1 and HLE1 of the luminance component of the macroblock and at boundaries VCE1 and HCE1 of the chrominance component of the macroblock." *Id.* at 6–7. Appellant cites to a "specific definition" in the Specification that VLE1, HLE1, VCE1, and HCE1 are the boundaries between macroblocks. Reply Br. 3 (citing Spec. 12: 7–8). Appellant further emphasizes that "vertical and horizontal boundaries (VLE1, HLE1) between blocks in the luminance components, as disclosed on lines 31–32 of page 11 and lines 1-2 of page 12, are filtered, as well as vertical and horizontal boundaries (VCE1, HCE1) between blocks in the chrominance components." *Id.* Appellant argues that Ikeda teaches the use of line boundary detecting unit 242, not boundaries between macroblocks for both luminance and chrominance components in the reconstructed frame. Appeal Br. 7. Appellant argues that Ikeda's specific example of filtering at the inter-LCU boundary would not be viewed by a person having ordinary skill in the art as equivalent to filtering only at the claimed boundaries. *Id.*

We are not persuaded by Appellant's argument that Ikeda's filtering at the inter-LCU boundary is not equivalent to the claimed boundary filtering because Ikeda's filtered boundaries are not boundaries between macroblocks. Reply Br. 3. Appellant argues that the claimed macroblocks are described in the Specification as blocks having boundaries in luminance and chrominance components. *Id*. The Examiner finds Ikeda to filter at inter-LCU boundaries, which the Examiner equates to filtering at macroblock boundaries. We agree with this finding because Ikeda states, "the term block or macroblock also includes a coding unit (CU)." Ikeda ¶ 443. Accordingly, we agree with the Examiner that Ikeda teaches filtering at inter-macroblock boundaries. The Examiner has pointed to Ikeda's description, in its discussion of filtering at line boundaries, of luminance component filtering separate from chrominance component filtering. *See* Ikeda ¶¶ 169–173. In its discussion of such filtering, Ikeda provides different mathematical formulas for luminance filtering (Mathematical formulas 1–4) from those for chrominance filtering (Mathematical formulas 5, 6). *Id.* Accordingly, we agree with the Examiner's finding that Ikeda teaches or suggests applying filters at the boundaries between macroblocks for both luminance and chrominance components.

With respect to Appellant's reliance on a "specific," i.e., a special, definition of macroblock in the Specification at page 12, lines 7–8, we do not find the cited section of the Specification inconsistent with the Examiner's application of Ikeda. Claim 1 requires that filtering be applied "at boundaries between macroblocks for both luminance and chrominance components." We agree that the cited sections of Ikeda, for the reasons

discussed above and by the Examiner, teach such a limitation. To the extent that Appellant argues that claim 1 should be read as filtering at luminance macroblock boundaries and at chrominance macroblock boundaries, we are not persuaded that the claim requires such a reading, or that the Specification supports such a reading. The Specification does not clearly support Appellant's alleged special definition of macroblock. To provide a special definition of a term that departs from the clear and ordinary meaning of a term requires notice of the change in meaning with "reasonable clarity, deliberateness, and precision." *See In re Paulsen,* 30 F.3d 1475, 1480 (Fed. Cir. 1994). Appellant's alleged special definition is in a section described as an embodiment of the invention, and does not clearly apply to the entire scope of claim 1. Spec. 10:28–30 ("The functioning of the deblocking filter according to embodiments of the invention will be described in detail later below."). Furthermore, Appellant's Specification describes a single macroblock having both a luminance component 200a and a chrominance component 200b, not a macroblock(s) defined by boundaries of luminance and chrominance components. Spec. 11:21–28. Based upon a reading of the Specification as a whole, Appellant has not persuaded us that the macroblock boundaries of Ikeda, for which luminance and chrominance components are separately filtered, do not teach or suggest the claimed application of a filter "at boundaries between macroblocks for both luminance and chrominance components."

Accordingly, we sustain the Examiner's rejection of claim 1. Claims 2–7, 9–12, 14, and 15 are rejected under the same grounds of rejection as claim 1. Appellant argues claims 4–7, 9–12, 14, and 15 on the same

reasoning as for claim 1, and we treat those claims as falling with claim 1. 37 C.F.R. § 41.63(c)(1)(iv)(2018). Consequently, we sustain the Examiner's rejection of claims 4–7, 9–12, 14, and 15.

Claim 2 adds the further limitation of "using the reconstructed reference frame in the predictive algorithm to reconstruct another frame." With respect to claim 2, Appellant argues that Avadhanam discloses that the "deblocking frame also facilitates **motion prediction,** since the deblocked frame is used as the reference frame," but not "using the reconstructed reference frame in the predictive algorithm to **reconstruct another frame**" as claimed. Appeal Br. 8. Appellant argues that the Examiner has not pointed to any teaching of the applied references, either express or inherent, for that limitation.

The Examiner finds Avadhanam to teach a deblocked frame used as a reference frame. Final Act. 7; Ans. 11. The Examiner further finds that "reference frames are commonly known to be used to reconstruct other frames using motion prediction as parts of a reference frame are used to reconstruct new frames where there are similarities between the frames saving on data that needs to be sent and a central component of video compression." Ans. 11 (emphasis omitted).

We agree with Appellant that the Examiner has not shown Avadhanam to teach the claimed step of using the reference frame to reconstruct another frame, either expressly or inherently. However, in the Answer, the Examiner finds that it is known in the art to perform such a use, providing a reasoned explanation in support of that finding. Ans. 11. Such a finding is permissible where the finding is "capable of such instant and

unquestionable demonstration as to defy dispute." *In re Ahlert,* 424 F.2d

1088, 1091 (CCPA 1970). Such a finding has been found to be appropriate

where it is supported by other references of record, or where there is nothing

in the record to contradict it. *See In re Soli*, 317 F.2d 941, 945-46, (CCPA

1963) (accepting the examiner's assertion that the use of "a control is

standard procedure throughout the entire field of bacteriology" because it

was readily verifiable and disclosed in references of record not cited by the

Office); *In re Chevenard*, 139 F.2d 711, 713 (CCPA 1943) (accepting the

examiner's finding that a brief heating at a higher temperature was the

equivalent of a longer heating at a lower temperature where there was

nothing in the record to indicate the contrary and where the applicant never

demanded that the examiner produce evidence to support his statement).

While Appellant argues that this teaching is not found in the applied

references, Appellant does not argue that the Examiner's finding is

inaccurate or unsupported in the art. Appeal Br. 8. To the contrary,

Appellant's Specification describes the H.264 video coding standard, shown

in Figure 1, as including a step of using prediction error and a previously

decoded frame to result in a reconstructed frame. Spec. 9:6 ("Fig. 1 is a

block diagram of a H.264 decoder"); 10:1–13. We further note that

Avadhanam contemplates using "standard video codecs such as . . . H.264,"

in the section cited by the Examiner for the rejection of claim 2.

Avadhanam ¶ 5; *see also* Avadhanam ¶¶ 16 ("[Figure 8] uses the same

terminology as described in: Overview of the U.264/AVC Video Coding

Standard"), 37 ("particular reference is made herein to the H.264-AVC

video compression standard"), 60 ("the following description provides

several non-limiting examples and methods for adaptively controlling the deblocking complexity for the H.264-AVC standard"). Thus, Appellant has not pointed to anything in the record to contradict the Examiner's finding, and there is evidence as to the use of a previously decoded (reference) frame to create a reconstructed frame in the H.264 video coding standard, used Avadhanam. Accordingly, we sustain the Examiner's rejection of claim 2.

Claim 3 further comprises "skipping deblocking-filtering for block-boundaries within at least one of the two macroblocks." Appellant argues that the Examiner's citation to paragraph 61 and Table 1 of Avadhanam, without explanation, does not teach or suggest the claimed limitation. Appeal Br. 9. Appellant further argues that although the Examiner presents a hypothetical in which certain border strengths (BS=0) would cause the filtering to be skipped, the Examiner has not shown Avadhanam would necessarily skip filtering for block boundaries within at least one of the two macroblocks. *Id.*

As discussed for claim 1, we agree with the Examiner's finding that Avadhanam teaches or suggests filtering at boundaries between macroblocks. The Examiner has further relied upon He to teach or suggest skipping deblocking-filtering at other block boundaries, through "adaptively disabling deblock filtering based on a content characteristic of the video information and also based on power savings considerations)." Ans. 4–5 (citing He ¶ 35). The Examiner further relies on Avadhanam's teaching of different boundary strength ("BS") values depending on whether one the blocks is "Intra" (Table 1), and where filtering takes place only if certain conditions are met (paragraph 62). Ans. 11.

We are not persuaded by Appellant's argument. Appellant argues that Avadhanam does not necessarily teach that filtering will be skipped for block boundaries within a macroblock. However, the Examiner has pointed to teachings of Avadhanam that discuss whether to filter based on the "Intra" status of the block. Avadhanam's example of "a line of four pixels each in the interior of two 4x4 blocks" having a block edge between two of the pixels states that certain conditions will cause no filtering to occur for non-zero BS values. Avadhanam ¶ 62. Thus, Avadhanam provides support for the Examiner's findings. Appellant has not explained how these cited sections lack a teaching or suggestion of skipping filtering for block boundaries within the interior of a macroblock. In view of the Examiner's cited sections of Avadhanam, we are not persuaded that Avadhanam does not teach or suggest skipping filtering for block boundaries within the interior of a macroblock. Consequently, we sustain the Examiner's rejection of claim 3.

Claim 8, rejected over Avadhanam, He, and Ikeda as applied to claim 1, and further in view of Fu, is argued to be non-obvious upon the same arguments made against the rejection of claim 1. We have found those arguments unpersuasive. Accordingly, we are not persuaded of error in the rejection of claim 8, and sustain the Examiner's rejection of claim 8.

CONCLUSION

For the above-described reasons, we affirm the Examiner's rejection of claims 1–12, 14, and 15 as being obvious over the applied references under 35 U.S.C. § 103.

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

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	References/Grounds	Affirmed	Reversed
1–7, 9–12, 14, 15	103	Avadhanam, He, Ikeda		
8	103	Avadhanam, He, Ikeda, Fu		
Overall Outcome			1–12, 14, 15	

AFFIRMED