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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ADARSH KRISHNAN RAMASUBRAMONIAN,
YE-KUI WANG, and YING CHEN

Appeal 2019-000789
Application 14/513,121
Technology Center 2400

Before JASON V. MORGAN, MICHAEL J. STRAUSS, and
MICHAEL M. BARRY, *Administrative Patent Judges*.

MORGAN, *Administrative Patent Judge*.

DECISION ON APPEAL
STATEMENT OF THE CASE

Introduction

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1–3, 5–7, 9–19, and 21–28. Claims 4, 8, and 20 are canceled. Appeal Br. 13–15. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party-in-interest as QUALCOMM Incorporated. Appeal Br. 3.

Summary of the disclosure

Appellant's claimed subject matter relates to management of "video information associated with a base layer (BL) and an enhancement layer (EL), the BL having a BL picture in a first access unit, and the EL having an EL picture in the first access unit." Abstract. Based on the value of a flag associated with a base layer picture, a processor either: "(1) remov[es] one or more EL pictures in a decoded picture buffer (DPB) without outputting the one or more EL pictures before the EL picture is coded, or (2) refrain[s] from removing the one or more EL pictures in the DPB without outputting the one or more EL pictures." *Id.*

Representative claim (disputed limitations emphasized)

1. An apparatus configured to code video information, the apparatus comprising:

a memory configured to store video data associated with a first layer associated with a smallest layer identifier (ID) value among all layer ID values of the video data and an enhancement layer (EL), the first layer having a current picture in a first access unit, and the EL having an EL picture in the first access unit; and

a processor in communication with the memory, the processor configured to:

determine, based on the current picture, that a cross-layer random access skip (CL-RAS) picture is not to be output;

based on the determination that a CL-RAS picture is not to be output, remove one or more EL pictures from a decoded picture buffer (DPB);

determine, based on a value of a variable, NoOutputOfPriorPicsFlag, that the one or more EL pictures are not to be output; and

based on the determination that the value of the variable, NoOutputOfPriorPicsFlag, indicates that the one or more

EL pictures are not to be output, not output the one or more EL pictures.

The Examiner's rejections and cited references

The Examiner rejects claims 1–3, 5–7, 9–19, and 21–28 under 35 U.S.C. § 103 as being obvious over Byeongdoo Choi et al., *MV-HEVC/SHVC HLS: Reference picture marking and picture removal*, Doc. Nos. JCTV-N0128, JCT3V-E0110, Joint Collaborative Teams on Video Coding (14th meeting) and 3D Video Coding Extensions (5th meeting) of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11, Vienna, Austria (2013) (“Choi”) and Hannuksela (US 2015/0078456 A1; published Mar. 19, 2015). Final Act. 7–22.

ADOPTION OF EXAMINER’S FINDINGS AND CONCLUSIONS

We agree with and adopt as our own the Examiner’s findings as set forth in the Answer and in the Action from which this appeal was taken, and we concur with the Examiner’s conclusions. We have considered Appellant’s arguments, but do not find them persuasive of error. We provide the following explanation for emphasis.

ANALYSIS

In rejecting claim 1 as obvious, the Examiner finds that Choi’s removal of pictures from a decoded picture buffer when a flag indicates they are not needed for output teaches or suggests “based on [a] determination . . . remov[ing] one or more [enhancement layer] pictures from a decoded picture buffer.” See Final Act. 8–9 (citing Choi 3); Ans. 20. The Examiner relies on Hannuksela’s NoClasOutputFlag value to teach or suggest the determination being that “a [cross-layer random access skip] picture is not to

be output.” *See* Final Act. 10 (citing Hannuksela ¶ 447); Ans. 20. The Examiner concludes that it would have been obvious to an artisan of ordinary skill to modify Choi to include and apply Hannuksela’s NoClrasOutputFlag value by removing one or more enhancement layer pictures from the decoded picture buffer because Hannuksela’s cross-layer random access skip pictures are similar to Choi’s random access skipped leading pictures, “and thus the benefit would similarly apply to the situation involving [cross-layer random access skip] pictures for improving the management of the buffers in the [decoded picture buffer].” Final Act. 10

Appellant contends the Examiner erred because the Examiner erroneously “imparts dependency in two distinct and independent references by arguing that the alleged disclosure in Choi to remove [enhancement layer] pictures from the [decoded picture buffer] would be dependent upon Hannuksela’s disclosure that [cross-layer random access skip] pictures are not to be output.” Appeal Br. 7; *see also* Reply Br. 2 (“the use of two variables from Choi[,] NoRaslOutputFlag and NoOutputOfPriorPicsFlag (even if combined with Hannuksela’s [NoClrasOutputFlag]) still fails to satisfy the limitation of Claim 1”). In particular, Appellant argues that “Hannuksela fails to describe that the NoClrasOutputFlag . . . has any bearing on removing any pictures from the [decoded picture buffer].” Appeal Br. 7–8; *see also* Reply Br. 2–3 (“replacing the NoRaslOutputFlag of Choi with the NoClrasOutputFlag of Hannuksela . . . still fails to show that, for every [cross-layer random access skip] picture not to be output, the [enhancement layer] pictures are in fact removed from the [decoded picture buffer]”).

Appellant’s arguments are unpersuasive because they improperly characterize the Examiner’s rejection. The Examiner does not rely on Hannuksela’s NoClrasOutputFlag value in combination with the NoOutputOfPriorPicsFlag value of Choi in a manner requiring that one value is dependent on the other. Rather, the Examiner concludes that it would have been obvious to modify Choi to handle a NoClrasOutputFlag value in a manner *similar* to the NoOutputOfPriorPicsFlag value—i.e., by removing pictures that are not to be output from the decoded picture buffer—while also continuing to handle the NoOutputOfPriorPicsFlag value. *See* Ans. 20–21.

The Examiner’s rejection is supported not only by Choi’s teaching “that all pictures that are not to be output should be removed from the” decoded picture buffer (Ans. 21; *see also* Choi 3), but by Hannuksela’s teachings that: (1) “when NoClrasOutputFlag is equal to 1 . . . the [cross-layer random access skip] pictures are not output” (Hannuksela ¶ 462); (2) “[a] picture may be considered as a [cross-layer random access skip] picture when . . . it resides in an enhancement layer” (*id.* ¶ 464); and (3) “[a] decoded picture may be removed from the [decoded picture buffer] when it . . . is not needed for output” (*id.* ¶ 211). That is, Hannuksela also teaches or suggests that the NoClrasOutputFlag value, by indicating not to output cross-layer random access skip pictures residing in an enhancement layer, would lead to one or more enhancement layer pictures being removed from a decoded picture buffer.

Appellant further argues “that incorporating Choi’s disclosure of clearing the [decoded picture buffer] based on the NoOutputOfPriorPicsFlag with the NoClrasOutputFlag of Hannuksela would cause Choi to

malfunction or operate improperly and change the principle of operation of Choi.” Appeal Br. 9; *see also* Reply Br. 4 (“the NoOutputOfPriorPicsFlag of Choi and the NoClrasOutputFlag of Hannuksela are established based on different aspects and serve different purposes when applied, [thus] the combination of flags would not ‘work[] in [a] cooperative manner’” (second set of brackets in Reply Brief)).

Appellant’s arguments are unpersuasive because, as Appellant submits, “the NoOutputOfPriorPicsFlag of Choi and the NoClrasOutputFlag of Hannuksela are established based on different aspects and serve different purposes when applied.” Reply Br. 4. That is, Choi and Hannuksela teach or suggest that the two flags can be interpreted and applied independently. Although the claimed invention recites both “remov[ing] one or more [enhancement layer] pictures from a decoded picture buffer” (based on a first determination) and “not output[ting] the one or more [enhancement layer] pictures” (based on a second determination), we are unable to ascertain anything that precludes configuring a processor: (1) to use the NoClrasOutputFlag value of Hannuksela to remove an enhancement layer picture *and* (2) to use the NoOutputOfPriorPicsFlag value of Choi being used to not output the picture. That is, we are unable to ascertain any evidence showing that Choi would malfunction or otherwise operate improperly based on such a configuration.

Appellant also argues it would not have been obvious to modify Choi based on the teachings and suggestions of Hannuksela because “Choi already describes that **‘all picture storage buffers in the [decoded picture buffer] except the pictures belonging to the same access unit are emptied, when the value of NoOutputOfPriorPicsFlag is equal to 1.’**” Appeal Br. 10

(citing Choi 1); *see also* Reply Br. 5. The Examiner correctly notes, however, that “Choi does not specifically disclose[] use of the [cross-layer random access skip] pictures.” Ans. 24. Moreover, Hannuksela does not limit the NoClrasOutputFlag value to being applicable to pictures that do *not* belong to the same access unit. Thus, the pictures affected by the NoOutputOfPriorPicsFlag value of Choi and the NoClrasOutputFlag value of Hannuksela may or may not overlap. Therefore, we find no error in the Examiner’s conclusion that it would have been obvious to an artisan of ordinary skill to modify Choi to *also* use and apply the NoClrasOutputFlag value of Hannuksela in the claimed manner (i.e., to remove enhancement layer pictures from a decoded picture buffer when a cross-layer random access skip picture is not to be output). *See* Final Act. 10.

Accordingly, we sustain the Examiner’s 35 U.S.C. § 103 rejection of claim 1, and claims 2, 3, 5–7, 9–19, and 21–28, which Appellant does not argue separately. Appeal Br. 11.

CONCLUSION

Claims Rejected	35 U.S.C. §	References	Affirmed	Reversed
1–3, 5–7, 9–19, 21–28	103	Choi, Hannuksela	1–3, 5–7, 9–19, 21–28	

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).

AFFIRMED