(12) **United States Patent**

Kim

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(54) **DOWN CONVERSION SYSTEM USING A PRE-DECIMATION FILTER**

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(52) **U.S. Cl.** **375/240.21**; 382/248

(58) **Field of Search** 375/240.16, 240.2, 375/240.25, 240, 240.12, 240.13, 240.21; 348/426.1, 441, 443, 445, 449, 458, 459, 556, 565, 384.1, 408.1, 427.1; 382/269, 264, 248, 232, 239

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(57) **ABSTRACT**

An HDTV down conversion system including an apparatus for forming a low resolution video signal from an encoded video signal representing a video image. The encoded video signal is a frequency-domain transformed high resolution video signal with motion vectors. The apparatus includes a receiver for receiving the encoded video signal as a plurality of blocks of high resolution frequency-domain video coefficient values. A plurality of blocks comprises a macroblock. A down-conversion filter weights selected ones of the high resolution frequency-domain video coefficient values within each block to generate corresponding blocks of filtered frequency-domain video coefficients. An inverse-transform processor transforms each block of filtered frequency-domain video coefficients into a block of first-filtered pixel values. A pre-decimation filter performs inter-macroblock inter-block filtering of the plurality of blocks of first-filtered pixel values and provides corresponding blocks of second-filtered pixel values. A decimating processor deletes selected ones of the second-filtered pixel values within each block to provide blocks of low resolution video signal pixel values.

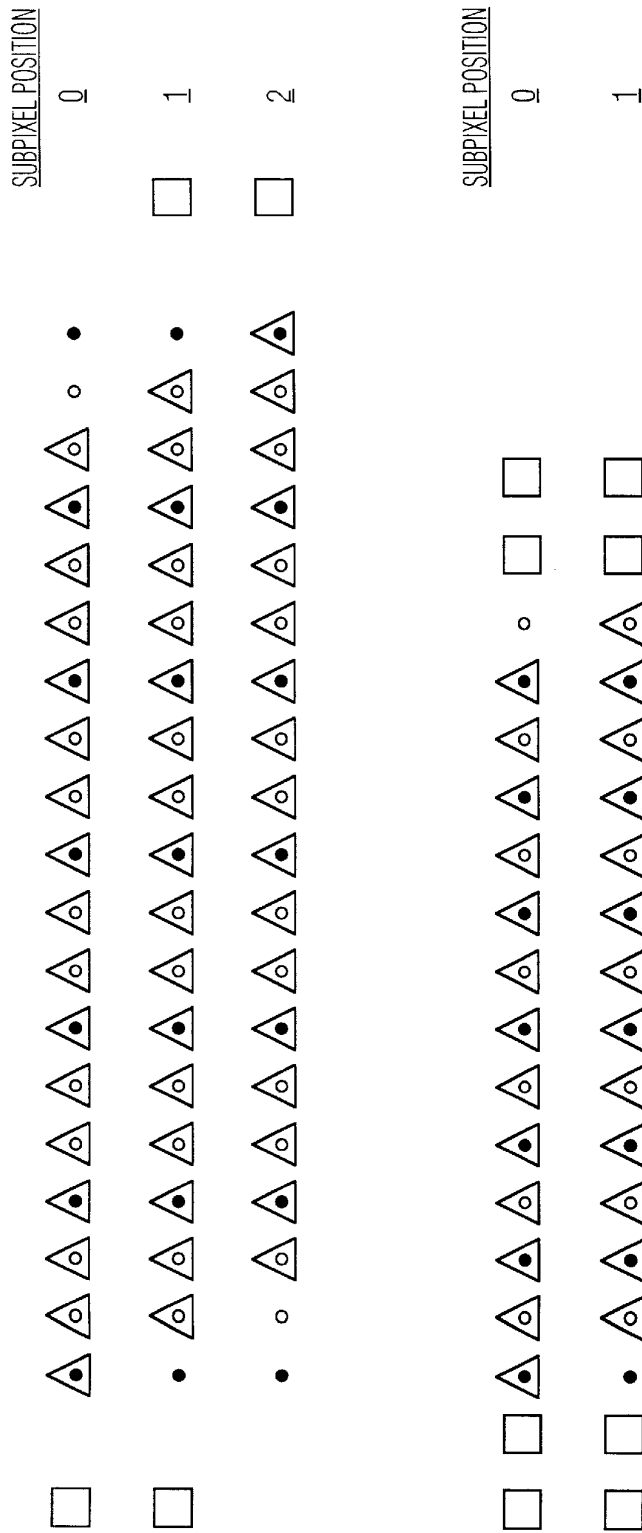**28 Claims, 8 Drawing Sheets**

FIG. 1
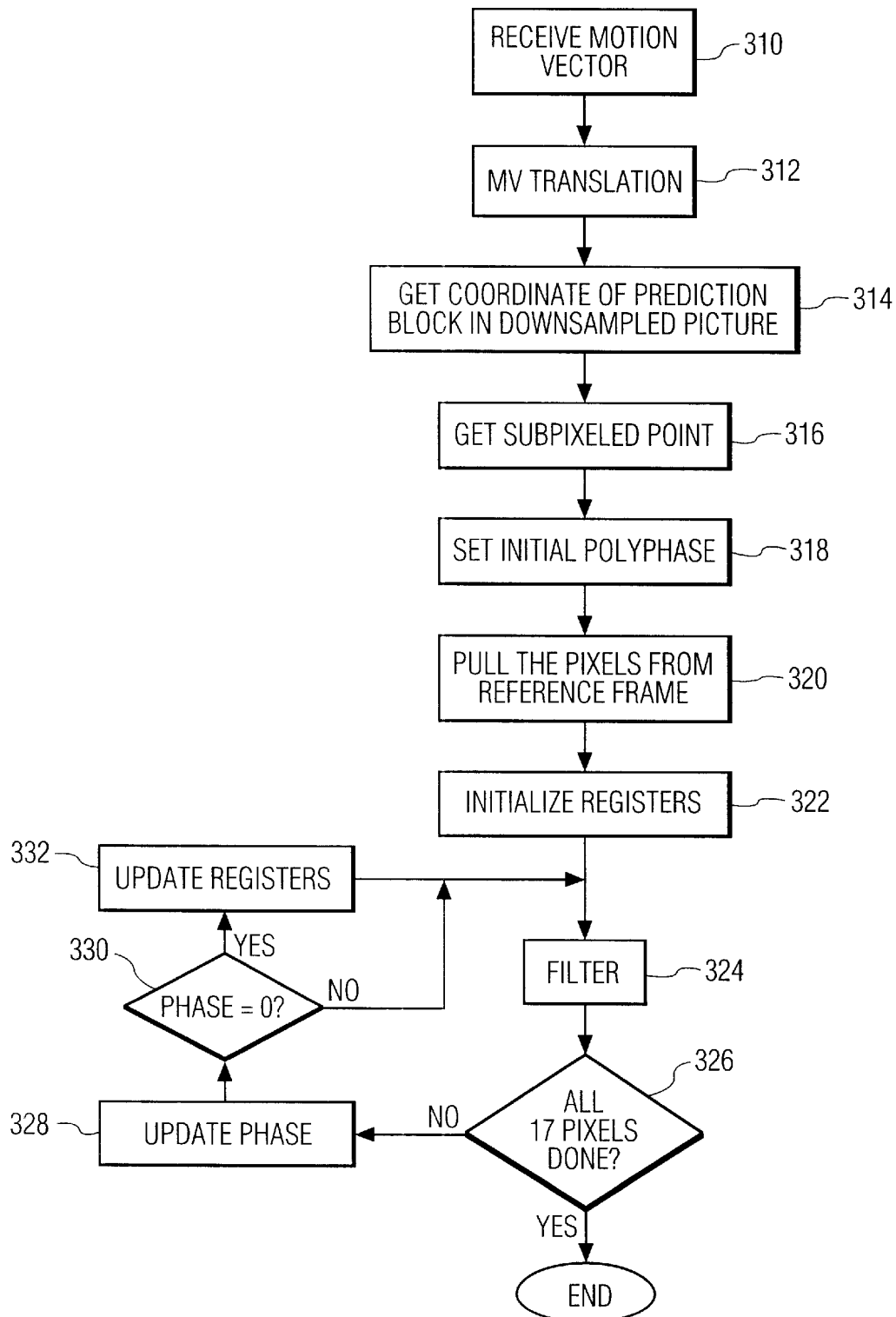PRIOR ART

FIG. 2

FIG. 3A

FIG. 3B

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