

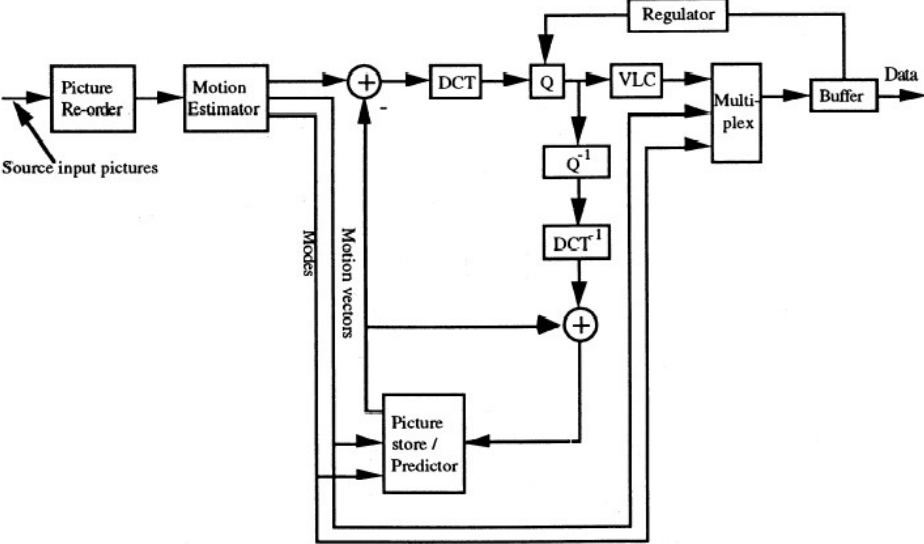
EXHIBIT A-9

ISO/IEC 11172-2:1993, INFORMATION TECHNOLOGY — CODING OF MOVING PICTURES AND ASSOCIATED AUDIO FOR DIGITAL STORAGE MEDIA AT UP TO ABOUT 1,5 MBIT/S — PART 2: VIDEO (“MPEG-1”) ANTICIPATES / RENDERS OBVIOUS U.S. PATENT NO. 7,532,808

As described in the following claim chart, claims 1-2, 6-7, 9-11, 15-16, 20-25, 28-30, 32, 34, 36, 39-41, 43-44, 47-49, 51-54, 58-60, 62-65 of U.S. Patent No. 7,532,808 (the “’808 patent”) are invalid in view of ISO/IEC 11172-2:1993, Information technology — Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s — Part 2: Video (“MPEG-1”) (RESPNOKIA_00000079), U.S. Patent No. 5,781,249 (“Hwang”) (RESPNOKIA_00006303), entitled “Full or Partial Search Block Matching Dependent on Candidate Vector Prediction Distortion,” and Applicant Admitted Prior Art (“AAPA”) from the ’808 patent (NOK_AMHP_ITC00000019), entitled “Method for Coding Motion in a Video Sequence.” MPEG-1 was available as a first edition publication on August 1, 1993, and is prior art under at least 35 U.S.C. §§ 102(a) and 102(b). Hwang was filed on November 7, 1996, published on July 14, 1998, and is prior art under at least pre-AIA 35 U.S.C. § 102(b). The ’808 patent filed on March 14, 2003, and published on May 12, 2009. The ’808 patent claims priority to U.S. provisional application No. 60/365,072 (NOK_AMHP_ITC00079535), filed on March 15, 2002.

To the extent that these Invalidity Contentions rely on or otherwise embody particular constructions of terms or phrases in the Asserted Claims, Respondents are not proposing any such constructions as proper constructions of those terms or phrases. Various positions put forth in this document are predicated on Complainants’ incorrect and overly broad interpretation of its claims. Those positions are not intended to and do not necessarily reflect Respondents’ interpretation of the true and proper scope of Complainants’ claims, and Respondents reserve the right to adopt claim construction positions that differ from or even conflict with various positions put forth in this document.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
1[preamble] A method of encoding a video sequence, the method comprising:	MPEG-1, as evidenced by the example citations below, discloses or renders obvious a method of encoding a video sequence. <i>See, e.g.,</i> Section 0.3.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	0.3 Encoding This part of ISO/IEC 11172 does not specify an encoding process. It specifies the syntax and semantics of the bitstream and the signal processing in the decoder. As a result, many options are left open to encoders to trade-off cost and speed against picture quality and coding efficiency. This clause is a brief description of the functions that need to be performed by an encoder. Figure 2 shows the main functional blocks.  <pre> graph LR Input[Source input pictures] --> Reorder[Picture Re-order] Reorder --> Estimator[Motion Estimator] Estimator --> Sum1((+)) Estimator --> Predictor[Picture store / Predictor] Predictor --> Sum1 Sum1 --> DCT[DCT] DCT --> Q[Q] Q --> VLC[VLC] VLC --> Mux[Multiplex] Mux --> Buffer[Buffer] Buffer --> Data[Data] Q --> Qinv[Q^-1] Qinv --> DCTinv[DCT^-1] DCTinv --> Sum2((+)) Predictor --> Sum2 Sum2 --> Predictor Regulator[Regulator] --> Q Regulator --> VLC Regulator --> Mux Regulator --> Buffer </pre> where - DCT is discrete cosine transform - DCT⁻¹ is inverse discrete cosine transform - Q is quantization - Q⁻¹ is dequantization - VLC is variable length coding Figure 2 -- Simplified video encoder block diagram “The encoder must choose which picture type to use for each picture. Having defined the picture

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	types, the encoder estimates motion vectors for each 16 by 16 macroblock in the picture. In P-pictures one vector is needed for each non-intra macroblock and in B-Pictures one or two vectors are needed. If B-Pictures are used, some reordering of the picture sequence is necessary before encoding. Because B-Pictures are coded using bidirectional motion compensated prediction, they can only be decoded after the subsequent reference picture (an I or P-Picture) has been decoded.” “The basic unit of coding within a picture is the macroblock. Within each picture, macroblocks are encoded in sequence, left to right, top to bottom. Each macroblock consists of six 8 by 8 blocks: four blocks of luminance, one block of Cb chrominance, and one block of Cr chrominance” “Firstly, for a given macroblock, the coding mode is chosen. It depends on the picture type, the effectiveness of motion compensated prediction in that local region, and the nature of the signal within the block. Secondly, depending on the coding mode, a motion compensated prediction of the contents of the block based on past and/or future reference pictures is formed. This prediction is subtracted from the actual data in the current macroblock to form (an error signal Thirdly, this error signal is separated into 8 by 8 blocks (4 luminance and 2 chrominance blocks in each macroblock) and a discrete cosine transform is performed on each block. Each resulting 8 by 8 block of DCT coefficients is quantized and the two-dimensional block is scanned in a zig-zag order to convert it into a one-dimensional string of quantized DCT coefficients. Fourthly, the side-information for the macroblock (mode, motion vectors etc) and the quantized coefficient data are encoded. For maximum efficiency, a number of variable length code tables are defined for the different data elements. Run-length coding is used for the quantized coefficient data.” <i>See also</i> MPEG-1 at Annex D.
1[a] assigning a skip coding mode to a first segment of a first frame of the sequence;	MPEG-1, as evidenced by the example citations below, discloses or renders obvious assigning a skip coding mode to a first segment of a first frame of the sequence.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>See, e.g.,</i> Section 2.1.131. “2.1.131 skipped macroblock [video]: A macroblock for which no data are stored.” Section 2.4.4.4 (emphasis added). “2.4.4.4 Skipped macroblocks For some macroblocks there are no coded data, that is neither motion vector information nor DCT information is available to the decoder. These macroblocks are called skipped macroblocks and are indicated when the macroblock-address-increment is greater than 1. In I-pictures, all macroblocks shall be coded and there shall be no skipped macroblocks. In P-pictures, the skipped macroblock is defined to be a macroblock with a reconstructed motion vector equal to zero and no DCT coefficients. In B-pictures, the skipped macroblock is defined to have the same macroblock-type (forward, backward, or both motion vectors) as the prior macroblock, differential motion vectors equal to zero, and no DCT coefficients. In a B-picture, a skipped macroblock shall not follow an intra-coded macroblock.”
1[b] assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the	MPEG-1, as evidenced by the example citations below, discloses or renders obvious assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment.

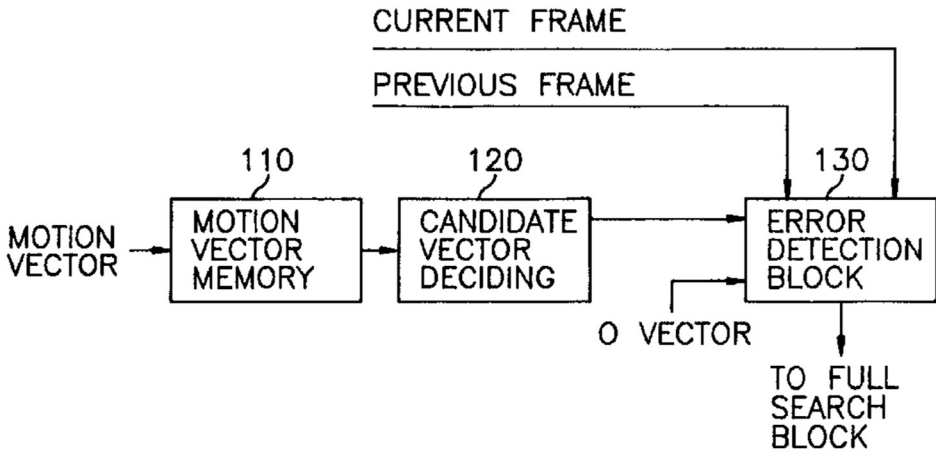
ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
first segment based at least in part on the motion information of a second segment neighboring the first segment; and	<i>See, e.g.,</i> Section 2.4.4.4 (emphasis added). “2.4.4.4 Skipped macroblocks For some macroblocks there are no coded data, that is neither motion vector information nor DCT information is available to the decoder. These macroblocks are called skipped macroblocks and are indicated when the macroblock-address-increment is greater than 1. In I-pictures, all macroblocks shall be coded and there shall be no skipped macroblocks. In P-pictures, the skipped macroblock is defined to be a macroblock with a reconstructed motion vector equal to zero and no DCT coefficients. In B-pictures, the skipped macroblock is defined to have the same macroblock-type (forward, backward, or both motion vectors) as the prior macroblock, differential motion vectors equal to zero, and no DCT coefficients. In a B-picture, a skipped macroblock shall not follow an intra-coded macroblock.” Further, Hwang, as evidenced by the example citations below, discloses or renders obvious assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment. <i>See, e.g.,</i> 1:6-10: The present invention relates to a method and an apparatus for detecting motion vectors; and, more particularly, to a method and an apparatus for determining a motion vector of a search block by using motion vectors of neighboring blocks of the search

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	block. 3:25-56: A current frame and a previous frame (in other words, a search frame and a reference frame) of a video signal are inputted to a motion vector detection block 100 and a full search block 200. At the motion vector detection block 100, to find a motion vector of a search block, i.e., a block currently being processed, motion vectors of processed neighboring blocks of the search block together with a 0 vector are examined to select a candidate motion vector, wherein processed blocks refers to blocks whose motion vectors are determined and the processed neighboring blocks are processed blocks neighboring the search block. The processed neighboring blocks whose motion vectors are utilized in detecting the motion vector of the search block $B(i,j)$ are exemplified in FIG. 4. As shown in FIG. 4, the search frame consists of a multiplicity of slices, each of which includes a number of blocks, the number of slices and the number of blocks in each slice being $N2$ and $N1$, respectively. The search frame are processed from the upper left corner to the lower right corner. Therefore, among 8 neighboring blocks surrounding the search block $B(i,j)$, motion vectors of 4 neighboring blocks, i.e., an upper left block $B(i-1, j-1)$, an upper middle block $B(i,j-1)$, an upper right block $B(i+1,j-1)$, and a middle left block $B(i-1,j)$, are known when the search block is processed, wherein j represents a slice number and i designates a location of a block in a slice, i and j being positive integers not larger than $N1$ and $N2$, respectively. It can be easily known that, if a search block is not located on the boundary of a frame, the number of processed neighboring blocks is 4. In case the search block is on the boundary as in the case of $B(1,1)$, $B(1,2)$ and so on, the number of processed neighboring blocks may be less than 4.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	4:13-17: In the present invention, the motion vector of the search block is either selected among the motion vectors of the processed neighboring blocks or decided by using the full search block matching. Therefore, the amount of computation is reduced compared to a motion estimator using only the full search block matching. Especially, the reduction is more prominent for a video signal wherein moving objects occupy a small portion thereof, because neighboring blocks are likely to yield similar motion vectors. 4:33-50: Referring to FIG. 2, there is provided a detailed block diagram of the motion vector detection block 100 shown in FIG. 1. The motion vectors of the processed blocks are fed to a motion vector memory 110, to be stored therein. Among them, neighboring vectors which refer to motion vectors of the processed neighboring blocks are selected and coupled to a candidate vector deciding block 120. Referring again to FIG. 4, when the search block $B(i,j)$ is being processed, at least motion vectors of the blocks $B(i-1, j-1)$ to $B(N1, j-1)$ and $B(1,j)$ to $B(i-1,j)$ should be stored at the motion vector memory 110. (Note that $B(i, j-1)$ to $B(N1, j-1)$ are necessary in determining motion vector of remaining blocks, i.e., $B(i+1, j)$ to $B(N1, j)$ included in a jth slice; and $B(1, j)$ to $B(i-1, j)$ are used in determining motion vectors of blocks included in a $(j+1)$st slice.) Therefore, the motion vector memory 110 should at least have $(N1+1)$ memory spaces each of which can accommodate a motion vector of a processed block. 4:51-59: At the candidate vector deciding block 120, an X-vector and an Y-vector are selected among the neighboring vectors, wherein the X-vector refers to a neighboring vector

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	which is most similar to a horizontal vector and the Y-vector refers to a neighboring vector which is most similar to a vertical vector, the horizontal and the vertical vectors referring to vectors whose y component and x component are 0, respectively. 5:7-53: A set of three candidate vectors, the set including the X-vector and the Y-vector provided from the candidate vector deciding block 120 and a 0 vector are fed to an error detection block 130. Referring to FIG. 4, in case the number of processed neighboring blocks is 1, (for example, a search block B(2,1)) the motion vector of the processed neighboring block (B(1,1)) may be decided as both of the X and the Y vectors. At the error detection block 130, a distortion between the search block and each of three predicted blocks corresponding to the three candidate vectors inputted thereto is determined, wherein the distortion is a value which represents a difference between two blocks. Of the three candidate vectors, one with a minimum distortion is selected as the candidate motion vector. If the minimum distortion of the candidate motion vector is smaller than the threshold TH, the candidate motion vector is determined as the final motion vector of the search block. Accordingly, a procedure for detecting a motion vector of the search block is completed and the motion vector is provided on L300 through the full search block 200. If the minimum distortion is not smaller than the threshold TH, the full search trigger signal is applied from the error detection block 130 to the full search block 200, which detects a motion vector of the search block by using the full search block matching method. Referring to FIG. 3, there is shown a more detailed block diagram of the error

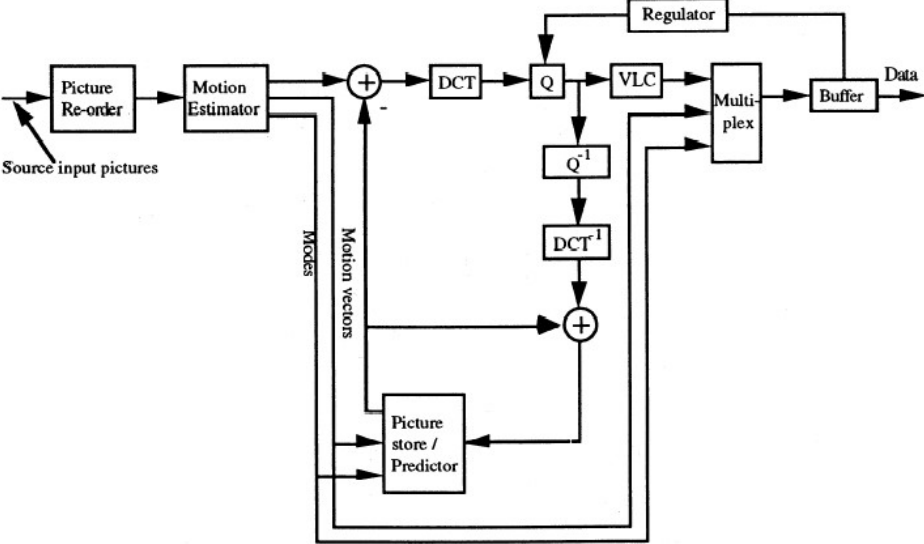
ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	detection block 130 shown in FIG. 2. The previous frame is coupled to a frame memory 132 which provides the three predicted blocks which are blocks of the previous frame displaced from the search block by the X-vector, the Y-vector and the 0 vector, respectively, in response to the three candidate vectors provided from the candidate vector deciding block 120. The three predicted blocks are fed to an error calculator 134 which calculates a distortion between the search block and each of the three predicted blocks. At a minimum selection block 136, a candidate vector which corresponds to a minimum distortion is selected as the candidate motion vector. The candidate motion vector and the minimum distortion are fed to a comparator 138. At the comparator 138, the minimum distortion is compared with the predetermined threshold TH. If the minimum distortion is smaller than TH, the candidate motion vector is provided as the motion vector of the search block; and otherwise, the full search trigger signal is applied to the full search block 200. Fig. 2:

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	 Fig. 4:

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<u>Rationale for combining MPEG-1 and Hwang</u> MPEG-1 and Hwang are each in the same field of endeavor of encoding and decoding video data. Both MPEG-1 and Hwang teach efficient methods of video compression using motion compensation. MPEG-1, Section 0.2; Hwang, 1:14-29, 2:7-13, 3:65-4:12.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>MPEG-1 discloses that a skipped macroblock (for P pictures) may be assigned a zero motion vector or (for B pictures) a motion vector (forward, backward, or both motion vectors) obtained from the prior neighboring macroblock but does not disclose the implementation details of how neighboring blocks are used to obtain a predicted motion vector for a current (skipped) macroblock. MPEG-1, Section 2.4.4.4. A POSITA would be motivated to look to other prior art for details on how to predict a current block's motion vector based on its neighboring blocks, and would have understood that the implementation details, as taught by Hwang, were a known solution.</i> <i>Hwang teaches how to use the motion vectors of neighboring blocks to determine the motion vector of a search (i.e., current) block. Hwang, Abstract, 2:42-44. Hwang explains that "a motion vector of a block may have a correlation with motion vectors of neighboring blocks, which can be utilized in reducing the computational burden required to determining [sic] the motion vectors." Hwang, 2:31-34. For example, the motion vector for the search block may be selected from three "candidate vectors," which consist of an X-vector and Y-vector (both of which are selected from the motion vectors of neighboring blocks), and a 0 vector. Hwang, 4:51-59, 5:7-10. Hwang further discloses calculating the distortions between the search block and each of the three predicted blocks corresponding to the three candidate vectors and selecting the candidate vector associated with the minimum distortion. Hwang, 5:15-21. Hwang further discloses that the motion vectors of processed blocks are stored in a motion vector memory 110, from which the motion vectors can be obtained when processing a subsequent neighboring search block. Hwang, 4:33-50, Figure 2, Figure 4. In other words, as part of processing a first search block, a zero vector may be selected for that first search block, and when subsequently processing a second search block ("first segment"), the previously processed first search block ("second segment") has been associated with a zero vector. An X-vector or Y-vector selected from that previously processed first search block may therefore be a zero vector. Furthermore, if that zero vector results in a predicted block that minimizes distortion of the second search block (the recited "first segment"), it will be selected as the second search block's motion vector.</i> <i>Combining Hwang's teaching of determining a block's motion vector based on candidate vectors derived from the motion vectors of processed neighboring blocks with MPEG-1's teaching of using a motion vector (forward, backward, or both motion vectors) obtained from the prior neighboring macroblock for a skipped macroblock provides an improved, computationally efficient, method for</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>determining predicted motion vectors. A POSITA would have been motivated to make this combination because it uses a known technique (Hwang's motion vector determination based on candidate vectors) to improve a similar system (using prior neighboring macroblock's motion vectors) in the same way (prediction based on the motion vectors of neighboring blocks).</i> <i>Thus, MPEG-1 explains using a zero motion vector or motion vector(s) from prior neighboring macroblocks, and Hwang supplements MPEG-1's teachings by illustrating how to determine whether to utilize the zero motion vector (e.g., when it minimizes distortion compared to other candidate motion vectors including the motion vectors from the neighboring blocks). A POSITA would have been motivated to combine MPEG-1 and Hwang as Hwang provides an improvement to MPEG-1 in terms of a criterion or basis to select a zero or non-zero motion vector based on information of neighboring blocks, and the combination of the two references would yield a predictable result of teaching or suggesting that "either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment [is assigned] based at least in part on the motion information of a second segment neighboring the first segment."</i> <i>See also Respondents' Joint Disclosure of Final Invalidity Contentions in Response to Individual Interrogatory Nos. 7-9.</i>
1[c] forming a prediction for the first segment with respect to a reference frame based at least in part on the assigned motion vector for the skip coding mode, wherein the assigned motion vector is one of the zero motion vector and the predicted non-zero motion vector; and	MPEG-1, as evidenced by the example citations below, discloses or renders obvious forming a prediction for the first segment with respect to a reference frame based at least in part on the assigned motion vector for the skip coding mode, wherein the assigned motion vector is one of the zero motion vector and the predicted non-zero motion vector. <i>See, e.g.,</i> Section 0.3 (emphasis added).

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	0.3 Encoding This part of ISO/IEC 11172 does not specify an encoding process. It specifies the syntax and semantics of the bitstream and the signal processing in the decoder. As a result, many options are left open to encoders to trade-off cost and speed against picture quality and coding efficiency. This clause is a brief description of the functions that need to be performed by an encoder. Figure 2 shows the main functional blocks.  <pre> graph LR Input[Source input pictures] --> Reorder[Picture Re-order] Reorder --> Estimator[Motion Estimator] Estimator --> Sum1((+)) Estimator --> Predictor[Picture store / Predictor] Predictor --> Sum1 Sum1 --> DCT[DCT] DCT --> Q[Q] Q --> VLC[VLC] VLC --> Mux[Multiplex] Mux --> Buffer[Buffer] Buffer --> Data[Data] Q --> Qinv[Q^-1] Qinv --> DCTinv[DCT^-1] DCTinv --> Sum2((+)) Predictor --> Sum2 Sum2 --> Mux Regulator[Regulator] --> Q Regulator --> Mux </pre> where - DCT is discrete cosine transform DCT^{-1} is inverse discrete cosine transform - Q is quantization Q^{-1} is dequantization - VLC is variable length coding Figure 2 -- Simplified video encoder block diagram “The encoder must choose which picture type to use for each picture. Having defined the picture

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	types, the encoder estimates motion vectors for each 16 by 16 macroblock in the picture. In P-pictures one vector is needed for each non-intra macroblock and in B-Pictures one or two vectors are needed. If B-Pictures are used, some reordering of the picture sequence is necessary before encoding. Because B-Pictures are coded using bidirectional motion compensated prediction, they can only be decoded after the subsequent reference picture (an I or P-Picture) has been decoded.” “The basic unit of coding within a picture is the macroblock. Within each picture, macroblocks are encoded in sequence, left to right, top to bottom. Each macroblock consists of six 8 by 8 blocks: four blocks of luminance, one block of Cb chrominance, and one block of Cr chrominance” “Firstly, for a given macroblock, the coding mode is chosen. It depends on the picture type, the effectiveness of motion compensated prediction in that local region, and the nature of the signal within the block. Secondly, depending on the coding mode, a motion compensated prediction of the contents of the block based on past and/or future reference pictures is formed. This prediction is subtracted from the actual data in the current macroblock to form (an error signal Thirdly, this error signal is separated into 8 by 8 blocks (4 luminance and 2 chrominance blocks in each macroblock) and a discrete cosine transform is performed on each block. Each resulting 8 by 8 block of DCT coefficients is quantized and the two-dimensional block is scanned in a zig-zag order to convert it into a one-dimensional string of quantized DCT coefficients. Fourthly, the side-information for the macroblock (mode, motion vectors etc) and the quantized coefficient data are encoded. For maximum efficiency, a number of variable length code tables are defined for the different data elements. Run-length coding is used for the quantized coefficient data.” D.2.2.3. “D.2.2.3 Predictive coding Predictive coding is a technique to improve the compression through statistical redundancy. Based

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	on values of pels previously decoded, both the encoder and decoder can estimate or predict the value of a pel yet to be encoded or decoded. The difference between the predicted and actual values is encoded. This difference value is the prediction error which the decoder can use to correct the prediction. Most error values will be small and cluster around the value 0 since pel values typically do not have large changes within a small spatial neighbourhood. The probability distribution of the prediction error is skewed and compresses better than the distribution of the pel values themselves. Additional information can be discarded by quantizing the prediction error. In this International Standard predictive coding is also used for the dc-values of successive luminance or chrominance blocks and in the encoding of motion vectors.”
1[d] providing in an encoded bitstream an indication of the skip coding mode, wherein no further motion vector information for the first segment is coded in the encoded bitstream.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious providing in an encoded bitstream an indication of the skip coding mode, wherein no further motion vector information for the first segment is coded in the encoded bitstream. <i>See, e.g.,</i> Section 2.1.131. “2.1.131 skipped macroblock [video]: A macroblock for which no data are stored.” Section 2.4.4.4 (emphasis added). “2.4.4.4 Skipped macroblocks For some macroblocks there are no coded data, that is neither motion vector information nor DCT information is available to the decoder. These macroblocks are called skipped macroblocks and are indicated when the macroblock-address-increment is greater than 1. In I-pictures, all macroblocks shall be coded and there shall be no skipped macroblocks. In P-pictures, the skipped macroblock is defined to be a macroblock with a reconstructed motion vector

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	equal to zero and no DCT coefficients. In B-pictures, the skipped macroblock is defined to have the same macroblock-type (forward, backward, or both motion vectors) as the prior macroblock, differential motion vectors equal to zero, and no DCT coefficients. In a B-picture, a skipped macroblock shall not follow an intra-coded macroblock.”
2. A method according to claim 1, wherein the second segment is a previously encoded segment neighboring the first segment.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious the second segment is a previously encoded segment neighboring the first segment. <i>See, e.g.,</i> Section 2.4.4.4. “2.4.4.4 Skipped macroblocks For some macroblocks there are no coded data, that is neither motion vector information nor DCT information is available to the decoder. These macroblocks are called skipped macroblocks and are indicated when the macroblock-address-increment is greater than 1. ... In B-pictures, the skipped macroblock is defined to have the same macroblock-type (forward, backward, or both motion vectors) as the prior macroblock, differential motion vectors equal to zero, and no DCT coefficients. In a B-picture, a skipped macroblock shall not follow an intra-coded macroblock.” Hwang, as evidenced by the example citations below, discloses or renders obvious the second segment is a previously encoded segment neighboring the first segment. <i>See, e.g.,</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	1:6-10: The present invention relates to a method and an apparatus for detecting motion vectors; and, more particularly, to a method and an apparatus for determining a motion vector of a search block by using motion vectors of neighboring blocks of the search block. 3:25-56: A current frame and a previous frame (in other words, a search frame and a reference frame) of a video signal are inputted to a motion vector detection block 100 and a full search block 200. At the motion vector detection block 100, to find a motion vector of a search block, i.e., a block currently being processed, motion vectors of processed neighboring blocks of the search block together with a 0 vector are examined to select a candidate motion vector, wherein processed blocks refers to blocks whose motion vectors are determined and the processed neighboring blocks are processed blocks neighboring the search block. The processed neighboring blocks whose motion vectors are utilized in detecting the motion vector of the search block $B(i,j)$ are exemplified in FIG. 4. As shown in FIG. 4, the search frame consists of a multiplicity of slices, each of which includes a number of blocks, the number of slices and the number of blocks in each slice being $N2$ and $N1$, respectively. The search frame are processed from the upper left corner to the lower right corner. Therefore, among 8 neighboring blocks surrounding the search block $B(i,j)$, motion vectors of 4 neighboring blocks, i.e., an upper left block $B(i-1, j-1)$, an upper middle block $B(i,j-1)$, an upper right block $B(i+1,j-1)$, and a middle left block $B(i-1,j)$, are known when the search block is processed, wherein j represents a slice number and i designates a location of a block in a slice, i and j being positive integers not larger than $N1$ and $N2$, respectively. It can be easily known that, if a

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	search block is not located on the boundary of a frame, the number of processed neighboring blocks is 4. In case the search block is on the boundary as in the case of B(1,1), B(1,2) and so on, the number of processed neighboring blocks may be less than 4. 4:13-17: In the present invention, the motion vector of the search block is either selected among the motion vectors of the processed neighboring blocks or decided by using the full search block matching. Therefore, the amount of computation is reduced compared to a motion estimator using only the full search block matching. Especially, the reduction is more prominent for a video signal wherein moving objects occupy a small portion thereof, because neighboring blocks are likely to yield similar motion vectors. 4:33-50: Referring to FIG. 2, there is provided a detailed block diagram of the motion vector detection block 100 shown in FIG. 1. The motion vectors of the processed blocks are fed to a motion vector memory 110, to be stored therein. Among them, neighboring vectors which refer to motion vectors of the processed neighboring blocks are selected and coupled to a candidate vector deciding block 120. Referring again to FIG. 4, when the search block B(i,j) is being processed, at least motion vectors of the blocks B(i-1, j-1) to B(N1, j-1) and B(1,j) to B(i-1,j) should be stored at the motion vector memory 110. (Note that B(i, j-1) to B(N1, j-1) are necessary in determining motion vector of remaining blocks, i.e., B(i+1, j) to B(N1, j) included in a jth slice; and B(1, j) to B(i-1, j) are used in determining motion vectors of blocks included in a (j+1)st slice.) Therefore, the motion vector memory 110 should at least have (N1+1) memory spaces each of which can accommodate a motion vector

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	of a processed block. 4:51-59: At the candidate vector deciding block 120, an X-vector and an Y-vector are selected among the neighboring vectors, wherein the X-vector refers to a neighboring vector which is most similar to a horizontal vector and the Y-vector refers to a neighboring vector which is most similar to a vertical vector, the horizontal and the vertical vectors referring to vectors whose y component and x component are 0, respectively. 5:7-53: A set of three candidate vectors, the set including the X-vector and the Y-vector provided from the candidate vector deciding block 120 and a 0 vector are fed to an error detection block 130. Referring to FIG. 4, in case the number of processed neighboring blocks is 1, (for example, a search block B(2,1)) the motion vector of the processed neighboring block (B(1,1)) may be decided as both of the X and the Y vectors. At the error detection block 130, a distortion between the search block and each of three predicted blocks corresponding to the three candidate vectors inputted thereto is determined, wherein the distortion is a value which represents a difference between two blocks. Of the three candidate vectors, one with a minimum distortion is selected as the candidate motion vector. If the minimum distortion of the candidate motion vector is smaller than the threshold TH, the candidate motion vector is determined as the final motion vector of the search block. Accordingly, a procedure for detecting a motion vector of the search block is completed and the motion vector is provided on L300 through the full search block 200.

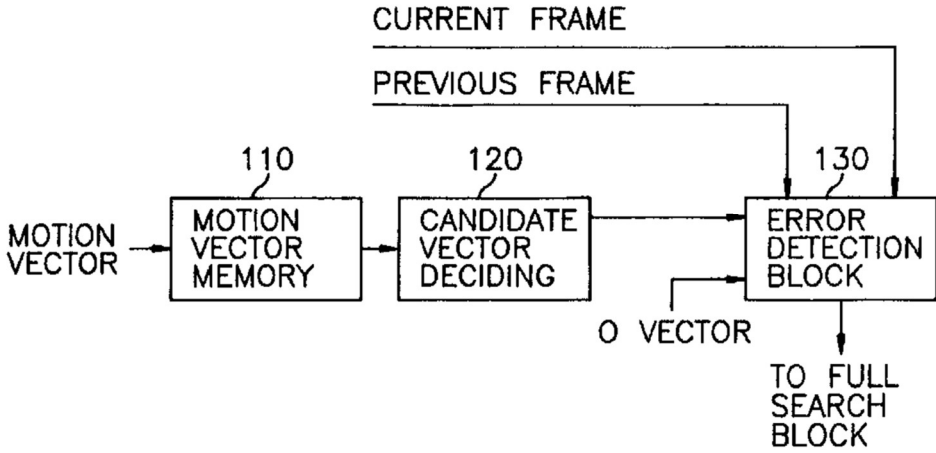
ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	If the minimum distortion is not smaller than the threshold TH, the full search trigger signal is applied from the error detection block 130 to the full search block 200, which detects a motion vector of the search block by using the full search block matching method. Referring to FIG. 3, there is shown a more detailed block diagram of the error detection block 130 shown in FIG. 2. The previous frame is coupled to a frame memory 132 which provides the three predicted blocks which are blocks of the previous frame displaced from the search block by the X-vector, the Y-vector and the 0 vector, respectively, in response to the three candidate vectors provided from the candidate vector deciding block 120. The three predicted blocks are fed to an error calculator 134 which calculates a distortion between the search block and each of the three predicted blocks. At a minimum selection block 136, a candidate vector which corresponds to a minimum distortion is selected as the candidate motion vector. The candidate motion vector and the minimum distortion are fed to a comparator 138. At the comparator 138, the minimum distortion is compared with the predetermined threshold TH. If the minimum distortion is smaller than TH, the candidate motion vector is provided as the motion vector of the search block; and otherwise, the full search trigger signal is applied to the full search block 200. <i><u>Rationale for combining MPEG-1 and Hwang</u></i> <i>See limitation 1[b].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
6. A method according to claim 1, wherein if the second segment has zero motion vector, the zero motion vector is assigned for skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if the second segment has zero motion vector, the zero motion vector is assigned for skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See limitations 1[b], 1[c].</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if the second segment has zero motion vector, the zero motion vector is assigned for skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> 1:6-10: The present invention relates to a method and an apparatus for detecting motion vectors; and, more particularly, to a method and an apparatus for determining a motion vector of a search block by using motion vectors of neighboring blocks of the search block. 3:25-56: A current frame and a previous frame (in other words, a search frame and a reference frame) of a video signal are inputted to a motion vector detection block 100 and a full search block 200. At the motion vector detection block 100, to find a motion vector of a search block, i.e., a block currently being processed, motion vectors of processed

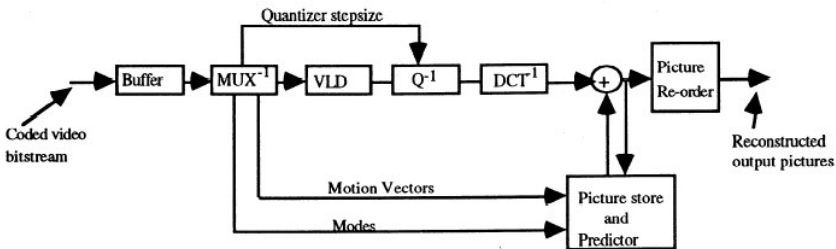
ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	neighboring blocks of the search block together with a 0 vector are examined to select a candidate motion vector, wherein processed blocks refers to blocks whose motion vectors are determined and the processed neighboring blocks are processed blocks neighboring the search block. The processed neighboring blocks whose motion vectors are utilized in detecting the motion vector of the search block $B(i,j)$ are exemplified in FIG. 4. As shown in FIG. 4, the search frame consists of a multiplicity of slices, each of which includes a number of blocks, the number of slices and the number of blocks in each slice being $N2$ and $N1$, respectively. The search frame are processed from the upper left corner to the lower right corner. Therefore, among 8 neighboring blocks surrounding the search block $B(i,j)$, motion vectors of 4 neighboring blocks, i.e., an upper left block $B(i-1, j-1)$, an upper middle block $B(i,j-1)$, an upper right block $B(i+1,j-1)$, and a middle left block $B(i-1,j)$, are known when the search block is processed, wherein j represents a slice number and i designates a location of a block in a slice, i and j being positive integers not larger than $N1$ and $N2$, respectively. It can be easily known that, if a search block is not located on the boundary of a frame, the number of processed neighboring blocks is 4. In case the search block is on the boundary as in the case of $B(1,1)$, $B(1,2)$ and so on, the number of processed neighboring blocks may be less than 4. 4:13-17: In the present invention, the motion vector of the search block is either selected among the motion vectors of the processed neighboring blocks or decided by using the full search block matching. Therefore, the amount of computation is reduced compared to a motion estimator using only the full search block matching. Especially, the reduction is more prominent for a video signal wherein moving objects occupy a small portion

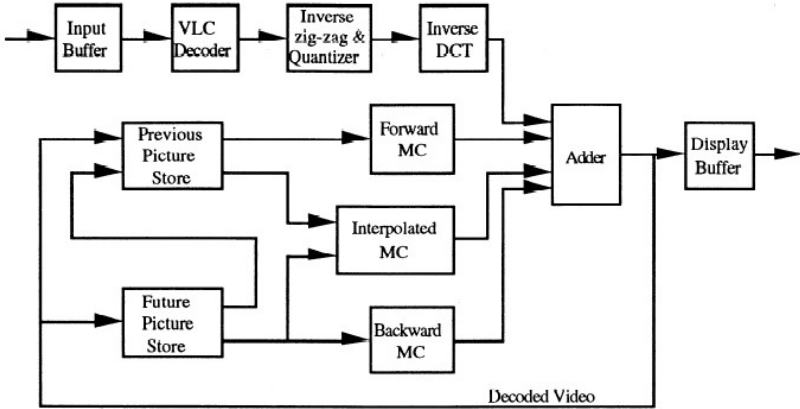
ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	thereof, because neighboring blocks are likely to yield similar motion vectors. 4:33-50: Referring to FIG. 2, there is provided a detailed block diagram of the motion vector detection block 100 shown in FIG. 1. The motion vectors of the processed blocks are fed to a motion vector memory 110, to be stored therein. Among them, neighboring vectors which refer to motion vectors of the processed neighboring blocks are selected and coupled to a candidate vector deciding block 120. Referring again to FIG. 4, when the search block $B(i,j)$ is being processed, at least motion vectors of the blocks $B(i-1, j-1)$ to $B(N1, j-1)$ and $B(1,j)$ to $B(i-1,j)$ should be stored at the motion vector memory 110. (Note that $B(i, j-1)$ to $B(N1, j-1)$ are necessary in determining motion vector of remaining blocks, i.e., $B(i+1, j)$ to $B(N1, j)$ included in a jth slice; and $B(1, j)$ to $B(i-1, j)$ are used in determining motion vectors of blocks included in a $(j+1)$st slice.) Therefore, the motion vector memory 110 should at least have $(N1+1)$ memory spaces each of which can accommodate a motion vector of a processed block. 4:51-59: At the candidate vector deciding block 120, an X-vector and an Y-vector are selected among the neighboring vectors, wherein the X-vector refers to a neighboring vector which is most similar to a horizontal vector and the Y-vector refers to a neighboring vector which is most similar to a vertical vector, the horizontal and the vertical vectors referring to vectors whose y component and x component are 0, respectively. 5:7-53: A set of three candidate vectors, the set including the X-vector and the Y-vector

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	provided from the candidate vector deciding block 120 and a 0 vector are fed to an error detection block 130. Referring to FIG. 4, in case the number of processed neighboring blocks is 1, (for example, a search block B(2,1)) the motion vector of the processed neighboring block (B(1,1)) may be decided as both of the X and the Y vectors. At the error detection block 130, a distortion between the search block and each of three predicted blocks corresponding to the three candidate vectors inputted thereto is determined, wherein the distortion is a value which represents a difference between two blocks. Of the three candidate vectors, one with a minimum distortion is selected as the candidate motion vector. If the minimum distortion of the candidate motion vector is smaller than the threshold TH, the candidate motion vector is determined as the final motion vector of the search block. Accordingly, a procedure for detecting a motion vector of the search block is completed and the motion vector is provided on L300 through the full search block 200. If the minimum distortion is not smaller than the threshold TH, the full search trigger signal is applied from the error detection block 130 to the full search block 200, which detects a motion vector of the search block by using the full search block matching method. Referring to FIG. 3, there is shown a more detailed block diagram of the error detection block 130 shown in FIG. 2. The previous frame is coupled to a frame memory 132 which provides the three predicted blocks which are blocks of the previous frame displaced from the search block by the X-vector, the Y-vector and the 0 vector, respectively, in response to the three candidate vectors provided from the candidate vector deciding block 120. The

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	three predicted blocks are fed to an error calculator 134 which calculates a distortion between the search block and each of the three predicted blocks. At a minimum selection block 136, a candidate vector which corresponds to a minimum distortion is selected as the candidate motion vector. The candidate motion vector and the minimum distortion are fed to a comparator 138. At the comparator 138, the minimum distortion is compared with the predetermined threshold TH. If the minimum distortion is smaller than TH, the candidate motion vector is provided as the motion vector of the search block; and otherwise, the full search trigger signal is applied to the full search block 200. Fig. 2:  <pre> graph LR MV[MOTION VECTOR] --> 110[MOTION VECTOR MEMORY] 110 --> 120[CANDIDATE VECTOR DECIDING] 120 --> 130[ERROR DETECTION BLOCK] CF[CURRENT FRAME] --> 130 PF[PREVIOUS FRAME] --> 130 OV[0 VECTOR] --> 130 130 --> FSB[TO FULL SEARCH BLOCK] </pre>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	Fig. 4: <i>Rationale for combining MPEG-1 and Hwang See limitation 1[b].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
7[preamble] A method of decoding an encoded video sequence, the method comprising:	MPEG-1, as evidenced by the example citations below, discloses or renders obvious a method of decoding an encoded video sequence. <i>See, e.g.,</i> Section 0.4. “0.4 Decoding Decoding is the inverse of the encoding operation. It is considerably simpler than encoding as there is no need to perform motion estimation and there (are many fewer options. The decoding process is defined by this part of ISO/IEC 11172. The description that follows is a very brief overview of one possible way of decoding a bitstream. Other decoders with different architectures are possible. Figure 4 shows the main functional blocks.  Where - DCT⁻¹ is inverse discrete cosine transform - Q⁻¹ is dequantization - MUX⁻¹ is demultiplexing - VLD is variable length decoding Figure 4 -- Basic video decoder block diagram As the decoder reads the bitstream, it identifies the start of a coded picture and then the type of the

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	picture. It decodes each macroblock in the picture in turn. The macroblock type and the motion vectors, if present, are used to construct a prediction of the current macroblock based on past and future reference pictures that have been stored in the decoder. The coefficient data are decoded and dequantized. Each 8 by 8 block of coefficient data is transformed by an inverse DCT (specified in annex A), and the result is added to the prediction signal and limited to the defined range. After all the macroblocks in the picture have been processed, the picture has been reconstructed, If it is an I-picture or a P-picture it is a reference picture for subsequent pictures and is stored, replacing the oldest stored reference picture. Before the pictures are displayed they may need to be re-ordered from the coded order to their natural display order. After reordering, the pictures are available, in digital form, for post-processing and display in any manner that the application chooses.” D.2.4. A simplified block diagram of a possible decoder implementation is shown below:  <pre> graph LR InputBuffer[Input Buffer] --> VLCDecoder[VLC Decoder] VLCDecoder --> InverseZigZag[Inverse zig-zag & Quantizer] InverseZigZag --> InverseDCT[Inverse DCT] InverseDCT --> Adder[Adder] PreviousPictureStore[Previous Picture Store] --> ForwardMC[Forward MC] PreviousPictureStore --> InterpolatedMC[Interpolated MC] FuturePictureStore[Future Picture Store] --> InterpolatedMC FuturePictureStore --> BackwardMC[Backward MC] ForwardMC --> Adder InterpolatedMC --> Adder BackwardMC --> Adder Adder --> DisplayBuffer[Display Buffer] DisplayBuffer --> DecodedVideo[Decoded Video] DecodedVideo --> PreviousPictureStore DecodedVideo --> FuturePictureStore </pre> Figure D.7 -- Simplified decoder block diagram

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
7[a] receiving an indication of a skip coding mode for a first segment;	MPEG-1, as evidenced by the example citations below, discloses or renders obvious receiving an indication of a skip coding mode for a first segment. <i>See, e.g., See limitation 1[a]. See limitation 1[d].</i>
7[b] assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment; and	MPEG-1, as evidenced by the example citations below, discloses or renders obvious assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment. <i>See, e.g., See limitation 1[b].</i> Hwang, as evidenced by the example citations below, discloses or renders obvious assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment. <i>See, e.g., 1:6-10:</i> The present invention relates to a method and an apparatus for detecting motion vectors; and, more particularly, to a method and an apparatus for determining a motion vector of a search block by using motion vectors of neighboring blocks of the search

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	block. 3:25-56: A current frame and a previous frame (in other words, a search frame and a reference frame) of a video signal are inputted to a motion vector detection block 100 and a full search block 200. At the motion vector detection block 100, to find a motion vector of a search block, i.e., a block currently being processed, motion vectors of processed neighboring blocks of the search block together with a 0 vector are examined to select a candidate motion vector, wherein processed blocks refers to blocks whose motion vectors are determined and the processed neighboring blocks are processed blocks neighboring the search block. The processed neighboring blocks whose motion vectors are utilized in detecting the motion vector of the search block $B(i,j)$ are exemplified in FIG. 4. As shown in FIG. 4, the search frame consists of a multiplicity of slices, each of which includes a number of blocks, the number of slices and the number of blocks in each slice being $N2$ and $N1$, respectively. The search frame are processed from the upper left corner to the lower right corner. Therefore, among 8 neighboring blocks surrounding the search block $B(i,j)$, motion vectors of 4 neighboring blocks, i.e., an upper left block $B(i-1, j-1)$, an upper middle block $B(i,j-1)$, an upper right block $B(i+1,j-1)$, and a middle left block $B(i-1,j)$, are known when the search block is processed, wherein j represents a slice number and i designates a location of a block in a slice, i and j being positive integers not larger than $N1$ and $N2$, respectively. It can be easily known that, if a search block is not located on the boundary of a frame, the number of processed neighboring blocks is 4. In case the search block is on the boundary as in the case of $B(1,1)$, $B(1,2)$ and so on, the number of processed neighboring blocks may be less than 4.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	4:13-17: In the present invention, the motion vector of the search block is either selected among the motion vectors of the processed neighboring blocks or decided by using the full search block matching. Therefore, the amount of computation is reduced compared to a motion estimator using only the full search block matching. Especially, the reduction is more prominent for a video signal wherein moving objects occupy a small portion thereof, because neighboring blocks are likely to yield similar motion vectors. 4:33-50: Referring to FIG. 2, there is provided a detailed block diagram of the motion vector detection block 100 shown in FIG. 1. The motion vectors of the processed blocks are fed to a motion vector memory 110, to be stored therein. Among them, neighboring vectors which refer to motion vectors of the processed neighboring blocks are selected and coupled to a candidate vector deciding block 120. Referring again to FIG. 4, when the search block $B(i,j)$ is being processed, at least motion vectors of the blocks $B(i-1, j-1)$ to $B(N1, j-1)$ and $B(1,j)$ to $B(i-1,j)$ should be stored at the motion vector memory 110. (Note that $B(i, j-1)$ to $B(N1, j-1)$ are necessary in determining motion vector of remaining blocks, i.e., $B(i+1, j)$ to $B(N1, j)$ included in a jth slice; and $B(1, j)$ to $B(i-1, j)$ are used in determining motion vectors of blocks included in a $(j+1)$st slice.) Therefore, the motion vector memory 110 should at least have $(N1+1)$ memory spaces each of which can accommodate a motion vector of a processed block. 4:51-59: At the candidate vector deciding block 120, an X-vector and an Y-vector are selected among the neighboring vectors, wherein the X-vector refers to a neighboring vector

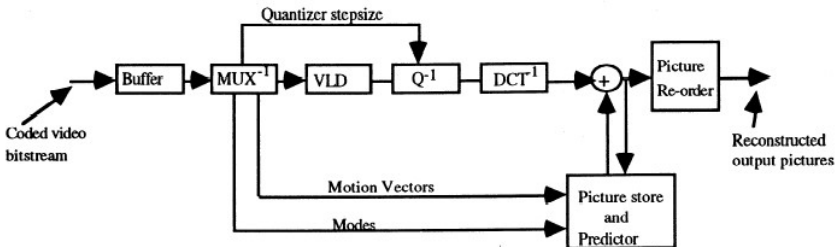
ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	which is most similar to a horizontal vector and the Y-vector refers to a neighboring vector which is most similar to a vertical vector, the horizontal and the vertical vectors referring to vectors whose y component and x component are 0, respectively. 5:7-53: A set of three candidate vectors, the set including the X-vector and the Y-vector provided from the candidate vector deciding block 120 and a 0 vector are fed to an error detection block 130. Referring to FIG. 4, in case the number of processed neighboring blocks is 1, (for example, a search block B(2,1)) the motion vector of the processed neighboring block (B(1,1)) may be decided as both of the X and the Y vectors. At the error detection block 130, a distortion between the search block and each of three predicted blocks corresponding to the three candidate vectors inputted thereto is determined, wherein the distortion is a value which represents a difference between two blocks. Of the three candidate vectors, one with a minimum distortion is selected as the candidate motion vector. If the minimum distortion of the candidate motion vector is smaller than the threshold TH, the candidate motion vector is determined as the final motion vector of the search block. Accordingly, a procedure for detecting a motion vector of the search block is completed and the motion vector is provided on L300 through the full search block 200. If the minimum distortion is not smaller than the threshold TH, the full search trigger signal is applied from the error detection block 130 to the full search block 200, which detects a motion vector of the search block by using the full search block matching method. Referring to FIG. 3, there is shown a more detailed block diagram of the error

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	detection block 130 shown in FIG. 2. The previous frame is coupled to a frame memory 132 which provides the three predicted blocks which are blocks of the previous frame displaced from the search block by the X-vector, the Y-vector and the 0 vector, respectively, in response to the three candidate vectors provided from the candidate vector deciding block 120. The three predicted blocks are fed to an error calculator 134 which calculates a distortion between the search block and each of the three predicted blocks. At a minimum selection block 136, a candidate vector which corresponds to a minimum distortion is selected as the candidate motion vector. The candidate motion vector and the minimum distortion are fed to a comparator 138. At the comparator 138, the minimum distortion is compared with the predetermined threshold TH. If the minimum distortion is smaller than TH, the candidate motion vector is provided as the motion vector of the search block; and otherwise, the full search trigger signal is applied to the full search block 200. Fig. 2:

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<pre> graph LR MV[MOTION VECTOR] --> 110[MOTION VECTOR MEMORY] 110 --> 120[CANDIDATE VECTOR DECIDING] 120 --> 130[ERROR DETECTION BLOCK] CF[CURRENT FRAME] --> 130 PF[PREVIOUS FRAME] --> 130 OV[0 VECTOR] --> 130 130 --> FS[TO FULL SEARCH BLOCK] </pre> Fig. 4:

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>Rationale for combining MPEG-1 and Hwang</i> <i>See limitation 1[b].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
7[c] forming a prediction for the first segment with respect to a reference frame based at least in part on the assigned motion vector for the skip coding mode, wherein the assigned motion vector is one of the zero motion vector and the predicted non-zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious forming a prediction for the first segment with respect to a reference frame based at least in part on the assigned motion vector for the skip coding mode, wherein the assigned motion vector is one of the zero motion vector and the predicted non-zero motion vector. <i>See, e.g.,</i> <i>See limitation 1[c].</i> Section 0.4. “0.4 Decoding Decoding is the inverse of the encoding operation. It is considerably simpler than encoding as there is no need to perform motion estimation and there (are many fewer options. The decoding process is defined by this part of ISO/IEC 11172. The description that follows is a very brief overview of one possible way of decoding a bitstream. Other decoders with different architectures are possible. Figure 4 shows the main functional blocks.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	 Where - DCT⁻¹ is inverse discrete cosine transform - Q⁻¹ is dequantization - MUX⁻¹ is demultiplexing - VLD is variable length decoding Figure 4 -- Basic video decoder block diagram As the decoder reads the bitstream, it identifies the start of a coded picture and then the type of the picture. It decodes each macroblock in the picture in turn. The macroblock type and the motion vectors, if present, are used to construct a prediction of the current macroblock based on past and future reference pictures that have been stored in the decoder. The coefficient data are decoded and dequantized. Each 8 by 8 block of coefficient data is transformed by an inverse DCT (specified in annex A), and the result is added to the prediction signal and limited to the defined range. After all the macroblocks in the picture have been processed, the picture has been reconstructed, If it is an I-picture or a P-picture it is a reference picture for subsequent pictures and is stored, replacing the oldest stored reference picture. Before the pictures are displayed they may need to be re-ordered from the coded order to their natural display order. After reordering, the pictures are available, in digital form, for post-processing and display in any manner that the application chooses.”
9. A method according to claim 7, wherein if a segment	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if a segment in a previously decoded region surrounding the first segment has zero motion vector, the zero-motion

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
in a previously decoded region surrounding the first segment has zero motion vector, the zero-motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 6.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if a segment in a previously decoded region surrounding the first segment has zero motion vector, the zero-motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 6.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b].</i>
10[preamble] A video encoder for encoding a video sequence, the encoder	MPEG-1, as evidenced by the example citations below, discloses or renders obvious a video encoder for encoding a video sequence.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
comprises:	<i>See limitation 1[preamble].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a video encoder for encoding a video sequence. <i>See, e.g.,</i> Fig. 1:

ASSERTED CLAIMS

PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA

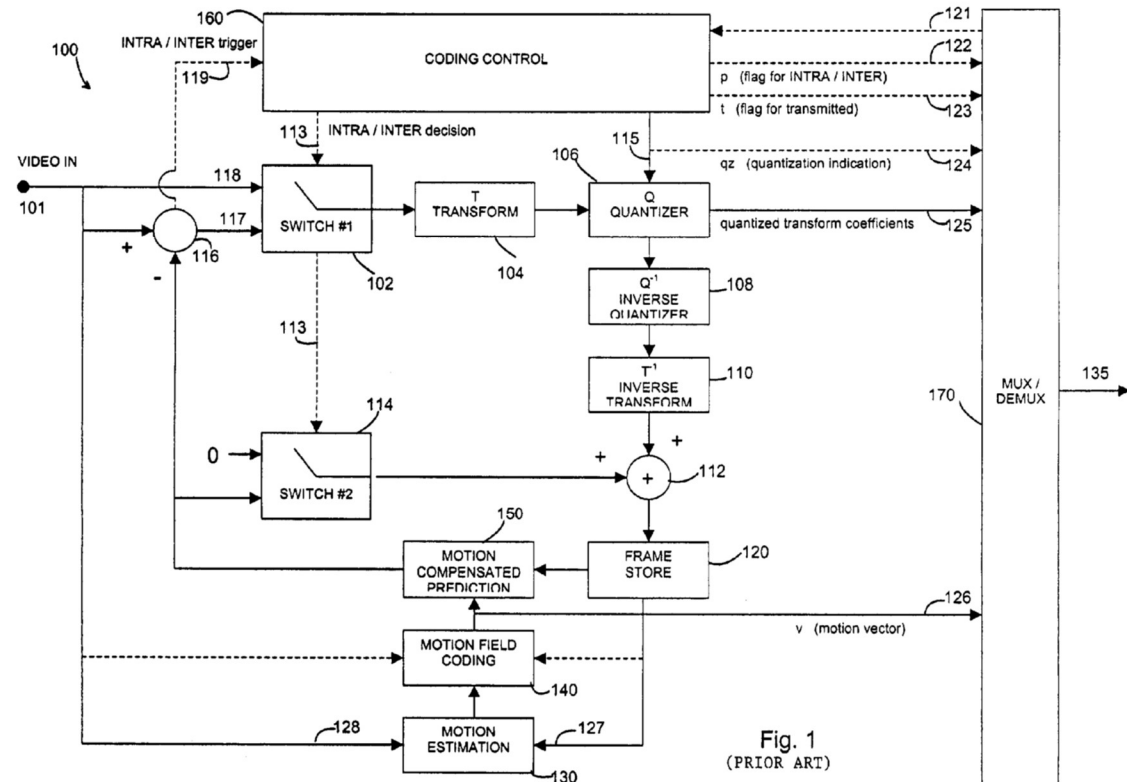


Fig. 1
(PRIOR ART)

3:11-25:

Generally, video coding systems not only reduce the spatial redundancy within

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	individual frames of a video sequence, but also make use of a technique known as “motion-compensated prediction”, to reduce the temporal redundancy in the sequence. Using motion-compensated prediction, the image content of some (often many) frames in a digital video sequence is “predicted” from one or more other frames in the sequence, known as “reference” frames. Prediction of image content is achieved by tracking the motion of objects or regions of an image between a frame to be coded (compressed) and the reference frame(s) using “motion vectors”. In general, the reference frame(s) may precede the frame to be coded or may follow it in the video sequence. As in the case of INTRA-coding, motion compensated prediction of a video frame is typically performed macroblock-by-macroblock. 3:44–4:12: In order to illustrate the operation of a generic video coding system in greater detail, reference will now be made to the exemplary video encoder and video decoder illustrated in FIGS. 1 and 2 of the accompanying drawings. The video encoder 100 of FIG. 1 employs a combination of INTRA- and INTER-coding to produce a compressed (encoded) video bit-stream and decoder 200 of FIG. 2 is arranged to receive and decode the video bit-stream produced by encoder 100 in order to produce a reconstructed video sequence. Throughout the following description it will be assumed that the luminance component of a macroblock comprises 16×16 pixels arranged as an array of 4, 8×8 blocks, and that the associated chrominance components are spatially sub-sampled by a factor of two in the horizontal and vertical directions to form 8×8 blocks, as depicted in FIG. 3. Extension of the description to other block sizes and other sub-sampling schemes will be apparent to those of ordinary skill in the art. The video encoder 100 comprises an input 101 for receiving a digital video signal from a camera or other video source (not shown). It also comprises a transformation

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	unit 104 which is arranged to perform a block-based discrete cosine transform (DCT), a quantizer 106, an inverse quantizer 108, an inverse transformation unit 110, arranged to perform an inverse block-based discrete cosine transform (IDCT), combiners 112 and 116, and a frame store 120. The encoder further comprises a motion estimator 130, a motion field coder 140 and a motion compensated predictor 150. Switches 102 and 114 are operated co-operatively by control manager 160 to switch the encoder between an INTRA-mode of video encoding and an INTER-mode of video encoding. The encoder 100 also comprises a video multiplex coder 170 which forms a single bit-stream from the various types of information produced by the encoder 100 for further transmission to a remote receiving terminal or, for example, for storage on a mass storage medium, such as a computer hard drive (not shown). <u>Rationale for combining MPEG-1 and AAPA</u> <i>The '808 Patent and MPEG-1 are each in the same field of endeavor of encoding and decoding video data. Both MPEG-1 and the '808 patent describe an encoder and decoder that use motion compensation. See, e.g., MPEG-1, Section 0.2, Annex D; '808 patent, Abstract, 1:9-11, 3:11-21.</i> <i>As described above, MPEG-1 discloses a method for compression of video signal data and describes both an encoder and decoder of video data. MPEG-1, Sections 0.3, 0.4, Annex D. However, MPEG-1 does not disclose the implementation details of those encoder and decoder components. A POSITA would have been motivated to look to AAPA's teachings for those implementation details, as both MPEG-1 and AAPA describe performing motion compensation for video. MPEG-1, Section 0.2; '808 Patent, 3:11-21.</i> <i>A POSITA would have had a reasonable expectation of success in making the proposed combination because it merely amounts to using known techniques (AAPA's exemplary video encoder and video decoder, and the components therein) to improve a similar system (MPEG-1's video coder and decoder, respectively) in the same way (to perform motion compensation of video using intra-frame</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>and inter-frame). This combination also merely amounts to combining prior art elements (AAPA's video encoder with coding control, motion compensated prediction, and multiplexer, and AAPA's video decoder with coding control, motion compensated prediction, and demultiplexer) according to known methods (as evidenced AAPA, which shows that a POSITA would have known how to use the disclosed video encoder and video decoder components in a similar video coding system).</i> <i>See also Respondents' Joint Disclosure of Final Invalidity Contentions in Response to Individual Interrogatory Nos. 7-9.</i>
10[a] a coding controller for assigning a skip coding mode to a first segment;	MPEG-1, as evidenced by the example citations below, discloses or renders obvious a coding controller for assigning a skip coding mode to a first segment. <i>See limitation 1[a].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a coding controller for assigning a skip coding mode to a first segment. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble]. As described above, the coding controller determines the encoding mode, and therefore a POSITA would have been motivated to use the well-known coding controller within an encoder (as described in the AAPA) to assign a skip coding mode (as disclosed by MPEG-1).</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
10[b] a motion estimation block for assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment; and	MPEG-1, as evidenced by the example citations below, discloses or renders obvious a motion estimation block for assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment. <i>See limitation 1[b].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a motion estimation block for assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble]. As described above, the motion estimation block of the MPEG-1-AAPA combination produces the motion vector for a macroblock, and therefore a POSITA would have been motivated to use it to assign the zero-motion vector or predicted non-zero motion vector for the first segment.</i>
10[c] forming a prediction for the first segment with respect to a reference frame based at least in part on the assigned motion vector for the skip	MPEG-1, as evidenced by the example citations below, discloses or renders obvious forming a prediction for the first segment with respect to a reference frame based at least in part on the assigned motion vector for the skip coding mode, wherein the assigned motion vector is one of the zero motion vector and the predicted non-zero motion vector.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
coding mode, wherein the assigned motion vector is one of the zero motion vector and the predicted non-zero motion vector; and	<i>See limitation 1[c].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious forming a prediction for the first segment with respect to a reference frame based at least in part on the assigned motion vector for the skip coding mode, wherein the assigned motion vector is one of the zero motion vector and the predicted non-zero motion vector. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble]. As described above, AAPA explains that “the first step in forming a prediction for a macroblock of the current frame is performed by motion estimation block 130,” and therefore a POSITA would have been motivated to use the motion estimation block of the MPEG-1-AAPA combination to form the prediction as recited by this limitation. ’808Pat, 7:30-32.</i>
10[d] a multiplexer for providing in an encoded bitstream an indication of the skip coding mode, wherein no further motion vector information for the first segment is coded in the encoded bitstream.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious a multiplexer for providing in an encoded bitstream an indication of the skip coding mode, wherein no further motion vector information for the first segment is coded in the encoded bitstream. <i>See limitation 1[d].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a multiplexer for providing in an encoded bitstream an indication of the skip coding mode, wherein no further motion

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	vector information for the first segment is coded in the encoded bitstream. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble]. As discussed above, a POSITA would have been motivated to use the well-known video multiplex coder, labeled “MUX/DEMUX,” to provide in an encoded bitstream an indication of the skip coding mode.</i>
11. An encoder according to claim 10, wherein the second segment is a previously encoded segment neighboring the first segment.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious the second segment is a previously encoded segment neighboring the first segment. <i>See claim 2.</i> Hwang, as evidenced by the example citations below, discloses or renders obvious the second segment is a previously encoded segment neighboring the first segment. <i>See claim 2.</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See limitation 1[b].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>
15. An encoder according to claim 10, wherein if a segment in a region surrounding the first segment has zero motion vector, the encoder is arranged to assign the zero motion vector for the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if a segment in a region surrounding the first segment has zero motion vector, the encoder is arranged to assign the zero motion vector for the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See claim 6.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	Hwang, as evidenced by the example citations below, discloses or renders obvious that if a segment in a region surrounding the first segment has zero motion vector, the encoder is arranged to assign the zero motion vector for the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 6.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b].</i>
16[preamble] A video decoder for decoding an encoded video sequence, the decoder comprising:	MPEG-1, as evidenced by the example citations below, discloses or renders obvious a video decoder for decoding an encoded video sequence. <i>See limitation 7[preamble].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a video decoder for decoding an encoded video sequence. <i>See, e.g.,</i> Fig. 2:

ASSERTED CLAIMS

PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA

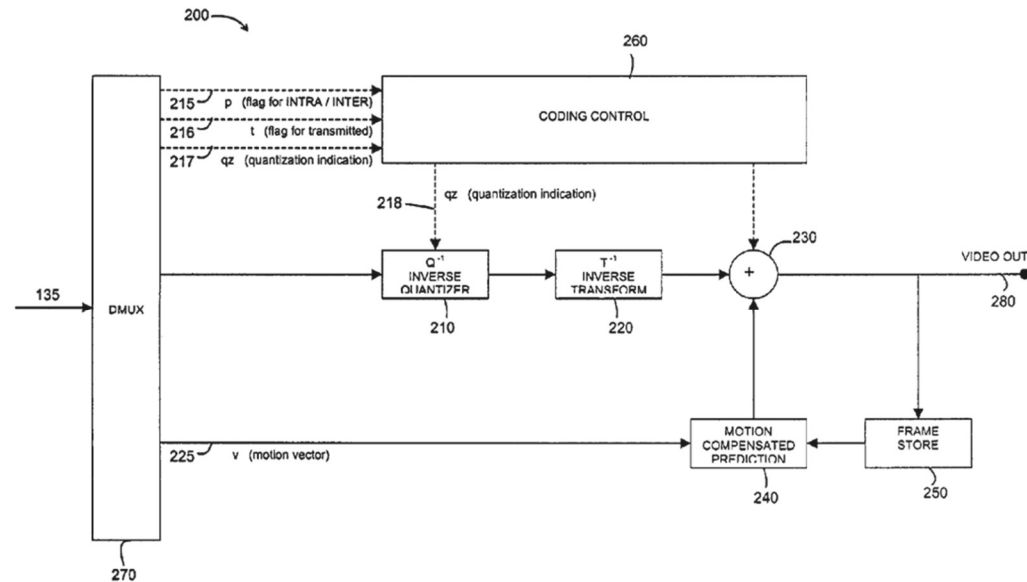


Fig. 2
(PRIOR ART)

8:19-26:

Operation of the video decoder 200, shown in FIG. 2 will now be described. The decoder 200 comprises a video multiplex decoder 270, which receives an encoded video bit-stream 135 from the encoder 100 and demultiplexes it into its constituent parts, an inverse quantizer 210, an inverse DCT transformer 220, a motion compensated prediction block 240, a frame store 250, a combiner 230, a control manager 260, and an output 280.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	3:11–25: Generally, video coding systems not only reduce the spatial redundancy within individual frames of a video sequence, but also make use of a technique known as “motion-compensated prediction”, to reduce the temporal redundancy in the sequence. Using motion-compensated prediction, the image content of some (often many) frames in a digital video sequence is “predicted” from one or more other frames in the sequence, known as “reference” frames. Prediction of image content is achieved by tracking the motion of objects or regions of an image between a frame to be coded (compressed) and the reference frame(s) using “motion vectors”. In general, the reference frame(s) may precede the frame to be coded or may follow it in the video sequence. As in the case of INTRA-coding, motion compensated prediction of a video frame is typically performed macroblock-by-macroblock. 3:44–4:12: In order to illustrate the operation of a generic video coding system in greater detail, reference will now be made to the exemplary video encoder and video decoder illustrated in FIGS. 1 and 2 of the accompanying drawings. The video encoder 100 of FIG. 1 employs a combination of INTRA- and INTER-coding to produce a compressed (encoded) video bit-stream and decoder 200 of FIG. 2 is arranged to receive and decode the video bit-stream produced by encoder 100 in order to produce a reconstructed video sequence. Throughout the following description it will be assumed that the luminance component of a macroblock comprises 16×16 pixels arranged as an array of 4, 8×8 blocks, and that the associated chrominance components are spatially sub-sampled by a factor of two in the horizontal and vertical directions to form 8×8 blocks, as depicted in FIG. 3. Extension of the description to other block sizes and other sub-sampling schemes will be apparent to those of ordinary

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	skill in the art. The video encoder 100 comprises an input 101 for receiving a digital video signal from a camera or other video source (not shown). It also comprises a transformation unit 104 which is arranged to perform a block-based discrete cosine transform (DCT), a quantizer 106, an inverse quantizer 108, an inverse transformation unit 110, arranged to perform an inverse block-based discrete cosine transform (IDCT), combiners 112 and 116, and a frame store 120. The encoder further comprises a motion estimator 130, a motion field coder 140 and a motion compensated predictor 150. Switches 102 and 114 are operated co-operatively by control manager 160 to switch the encoder between an INTRA-mode of video encoding and an INTER-mode of video encoding. The encoder 100 also comprises a video multiplex coder 170 which forms a single bit-stream from the various types of information produced by the encoder 100 for further transmission to a remote receiving terminal or, for example, for storage on a mass storage medium, such as a computer hard drive (not shown). <i><u>Rationale for combining MPEG-1 and AAPA</u></i> <i>See claim 10[preamble].</i>
16[a] a demultiplexer for receiving an indication of a skip coding mode assigned to a first segment;	MPEG-1, as evidenced by the example citations below, discloses or renders obvious a demultiplexer for receiving an indication of a skip coding mode for a first segment. <i>See limitations 7[preamble] and 7[a].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	AAPA, as evidenced by the example citations below, discloses or renders obvious a demultiplexer for receiving an indication of a skip coding mode assigned to a first segment. <i>See, e.g.,</i> <i>See limitation 16[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble]. As described above, the video multiplex decoder “demultiplexes [an encoded video bit stream] into its constituent parts,” which includes “separate[ing] the encoded information for the blocks of the macroblock from possible control information relating to the macroblock in question.” ’808Pat, 8:19-26, 8:40-43. A POSITA therefore would have been motivated to use the video multiplex decoder (“demultiplexer”) to receive an indication of the skip coding mode.</i>
16[b] a motion compensated prediction block for assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment; and	MPEG-1, as evidenced by the example citations below, discloses or renders obvious a motion compensated prediction block for assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment. <i>See limitation 7[b].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a motion compensated prediction block for assigning either a zero motion vector or a predicted non-zero motion vector for the skip coding mode for the first segment based at least in part on the motion information of a second segment neighboring the first segment.

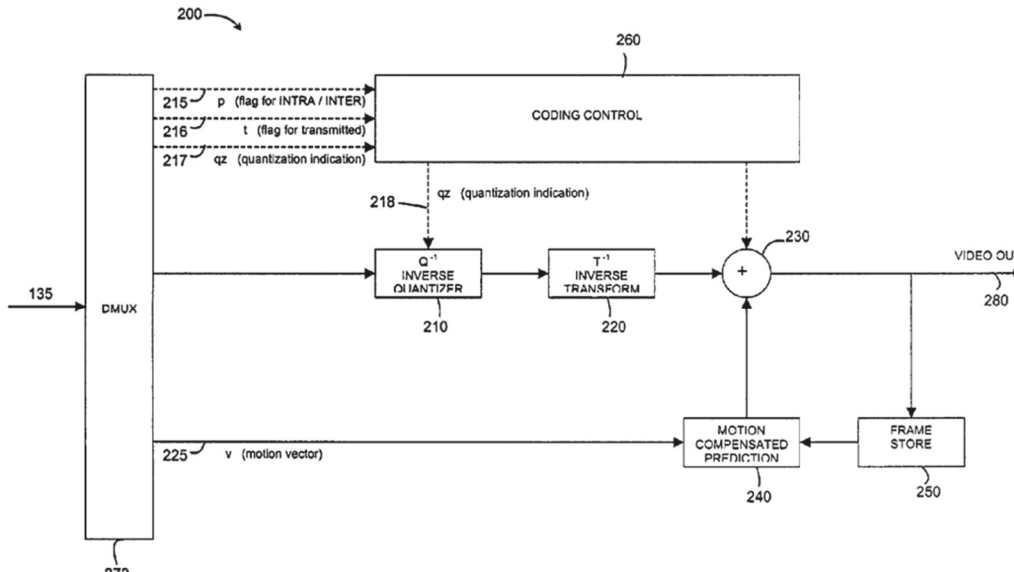
ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>See, e.g., See limitation 16[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble]. As described above, the motion compensated prediction block of the MPEG-1-AAPA combination reconstructs a motion vector for a macroblock, and therefore a POSITA would have been motivated to use the motion compensated prediction block to assign the zero motion vector or predicted non-zero motion vector for the first segment.</i>
16[c] forming a prediction for the first segment with respect to a reference frame based at least in part on the assigned motion vector for the skip coding mode, wherein the assigned motion vector is one of the zero motion vector and the predicted non-zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious forming a prediction for the first segment with respect to a reference frame based at least in part on the assigned motion vector for the skip coding mode, wherein the assigned motion vector is one of the zero motion vector and the predicted non-zero motion vector. <i>See limitation 7[c].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious forming a prediction for the first segment with respect to a reference frame based at least in part on the assigned motion vector for the skip coding mode, wherein the assigned motion vector is one of the zero motion vector and the predicted non-zero motion vector. <i>See, e.g., See limitation 16[preamble].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<u>Rationale for combining MPEG-1 and AAPA</u> <i>See claim 10[preamble]. As described above, the AAPA explains that the motion compensated prediction block 240 forms a prediction based on a motion vector and reference frame. '808Pat, 10:4-12. A POSITA therefore would have been motivated to use the motion compensated prediction block of the MPEG-1-AAPA combination to form the prediction as recited by this limitation.</i>
20. A decoder according to claim 16, wherein if a segment in a region surrounding the first segment has zero motion vector, the zero motion vector is assigned for the skip coding mode of the first segment, and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if a segment in a region surrounding the first segment has zero motion vector, the zero motion vector is assigned for the skip coding mode of the first segment, and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See claim 6.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a decoder. <i>See, e.g.,</i> <i>See limitation 16[preamble].</i> <u>Rationale for combining MPEG-1 and AAPA</u> <i>See claim 10[preamble].</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if a segment in

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	a region surrounding the first segment has zero motion vector, the zero motion vector is assigned for the skip coding mode of the first segment, and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 6.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b].</i>
21. A multimedia terminal, comprising an encoder according to claim 10.	AAPA, as evidenced by the example citations below, discloses or renders obvious a multimedia terminal, comprising an encoder according to claim 10. <i>See, e.g.,</i> Fig. 1:

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	individual frames of a video sequence, but also make use of a technique known as “motion-compensated prediction”, to reduce the temporal redundancy in the sequence. Using motion-compensated prediction, the image content of some (often many) frames in a digital video sequence is “predicted” from one or more other frames in the sequence, known as “reference” frames. Prediction of image content is achieved by tracking the motion of objects or regions of an image between a frame to be coded (compressed) and the reference frame(s) using “motion vectors”. In general, the reference frame(s) may precede the frame to be coded or may follow it in the video sequence. As in the case of INTRA-coding, motion compensated prediction of a video frame is typically performed macroblock-by-macroblock. 3:44–4:12: In order to illustrate the operation of a generic video coding system in greater detail, reference will now be made to the exemplary video encoder and video decoder illustrated in FIGS. 1 and 2 of the accompanying drawings. The video encoder 100 of FIG. 1 employs a combination of INTRA- and INTER-coding to produce a compressed (encoded) video bit-stream and decoder 200 of FIG. 2 is arranged to receive and decode the video bit-stream produced by encoder 100 in order to produce a reconstructed video sequence. Throughout the following description it will be assumed that the luminance component of a macroblock comprises 16×16 pixels arranged as an array of 4, 8×8 blocks, and that the associated chrominance components are spatially sub-sampled by a factor of two in the horizontal and vertical directions to form 8×8 blocks, as depicted in FIG. 3. Extension of the description to other block sizes and other sub-sampling schemes will be apparent to those of ordinary skill in the art.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	The video encoder 100 comprises an input 101 for receiving a digital video signal from a camera or other video source (not shown). It also comprises a transformation unit 104 which is arranged to perform a block-based discrete cosine transform (DCT), a quantizer 106, an inverse quantizer 108, an inverse transformation unit 110, arranged to perform an inverse block-based discrete cosine transform (IDCT), combiners 112 and 116, and a frame store 120. The encoder further comprises a motion estimator 130, a motion field coder 140 and a motion compensated predictor 150. Switches 102 and 114 are operated co-operatively by control manager 160 to switch the encoder between an INTRA-mode of video encoding and an INTER-mode of video encoding. The encoder 100 also comprises a video multiplex coder 170 which forms a single bit-stream from the various types of information produced by the encoder 100 for further transmission to a remote receiving terminal or, for example, for storage on a mass storage medium, such as a computer hard drive (not shown). <i><u>Rationale for combining MPEG-1 and AAPA</u></i> <i>See claim 10[preamble]. As described above, a POSITA would have understood a video coding system that “receiv[es] a digital video signal from a camera or other video source,” and “employs a combination of INTRA- and INTER-coding to produce a compressed (encoded) video bit-stream” is a multimedia terminal.</i>
22. A multimedia terminal comprising a decoder according to claim 16.	AAPA, as evidenced by the example citations below, discloses or renders obvious a multimedia terminal comprising a decoder according to claim 16. <i>See, e.g.,</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	Fig. 2:  Fig. 2 (PRIOR ART) 3:11–25: Generally, video coding systems not only reduce the spatial redundancy within individual frames of a video sequence, but also make use of a technique known as “motion-compensated prediction”, to reduce the temporal redundancy in the sequence. Using motion-compensated prediction, the image content of some (often many) frames

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	in a digital video sequence is “predicted” from one or more other frames in the sequence, known as “reference” frames. Prediction of image content is achieved by tracking the motion of objects or regions of an image between a frame to be coded (compressed) and the reference frame(s) using “motion vectors”. In general, the reference frame(s) may precede the frame to be coded or may follow it in the video sequence. As in the case of INTRA-coding, motion compensated prediction of a video frame is typically performed macroblock-by-macroblock. 3:44–4:12: In order to illustrate the operation of a generic video coding system in greater detail, reference will now be made to the exemplary video encoder and video decoder illustrated in FIGS. 1 and 2 of the accompanying drawings. The video encoder 100 of FIG. 1 employs a combination of INTRA- and INTER-coding to produce a compressed (encoded) video bit-stream and decoder 200 of FIG. 2 is arranged to receive and decode the video bit-stream produced by encoder 100 in order to produce a reconstructed video sequence. Throughout the following description it will be assumed that the luminance component of a macroblock comprises 16×16 pixels arranged as an array of 4, 8×8 blocks, and that the associated chrominance components are spatially sub-sampled by a factor of two in the horizontal and vertical directions to form 8×8 blocks, as depicted in FIG. 3. Extension of the description to other block sizes and other sub-sampling schemes will be apparent to those of ordinary skill in the art. The video encoder 100 comprises an input 101 for receiving a digital video signal from a camera or other video source (not shown). It also comprises a transformation unit 104 which is arranged to perform a block-based discrete cosine transform (DCT), a quantizer 106, an inverse quantizer 108, an inverse transformation unit 110, arranged to perform an inverse block-based discrete cosine transform (IDCT),

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	combiners 112 and 116, and a frame store 120. The encoder further comprises a motion estimator 130, a motion field coder 140 and a motion compensated predictor 150. Switches 102 and 114 are operated co-operatively by control manager 160 to switch the encoder between an INTRA-mode of video encoding and an INTER-mode of video encoding. The encoder 100 also comprises a video multiplex coder 170 which forms a single bit-stream from the various types of information produced by the encoder 100 for further transmission to a remote receiving terminal or, for example, for storage on a mass storage medium, such as a computer hard drive (not shown). 8:19-26: Operation of the video decoder 200, shown in FIG. 2 will now be described. The decoder 200 comprises a video multiplex decoder 270, which receives an encoded video bit-stream 135 from the encoder 100 and demultiplexes it into its constituent parts, an inverse quantizer 210, an inverse DCT transformer 220, a motion compensated prediction block 240, a frame store 250, a combiner 230, a control manager 260, and an output 280. 4:29-56: The occurrence of condition 1) is detected by monitoring the output of the combiner 116. The combiner 116 forms a difference between the current macroblock of the frame being coded and its prediction, produced in the motion compensated prediction block 150. If a measure of this difference (for example a sum of absolute differences of pixel values) exceeds a predetermined threshold, the combiner 116 informs the control manager 160 via a control line 119 and the control manager 160 operates the switches 102 and 114 via control line 113 so as to switch the encoder 100 into INTRA-coding mode. In this way, a frame which is

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	otherwise encoded in INTER-coded format may comprise INTRA-coded macroblocks. Occurrence of condition 2) is monitored by means of a timer or frame counter implemented in the control manager 160, in such a way that if the timer expires, or the frame counter reaches a predetermined number of frames, the control manager 160 operates the switches 102 and 114 via control line 113 to switch the encoder into INTRA-coding mode. Condition 3) is triggered if the control manager 160 receives a feedback signal from, for example, a receiving terminal, via control line 121 indicating that an INTRA frame refresh is required by the receiving terminal. Such a condition may arise, for example, if a previously transmitted frame is badly corrupted by interference during its transmission, rendering it impossible to decode at the receiver. In this situation, the receiving decoder issues a request for the next frame to be encoded in INTRA-coded format, thus re-initialising the coding sequence. <i>Rationale for combining MPEG-1 and AAPA</i> <i>See claim 10[preamble]. As discussed above, a POSITA would have understood that a video coding system that receives digital video signal from a camera or other video source is a multimedia terminal.</i>
23[preamble] A method according to claim 1, wherein if the second segment has a non-zero motion vector,	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that the second segment has a non-zero motion vector. <i>See, e.g.,</i> <i>See limitation 1[b].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	Section 2.4.4.4. “2.4.4.4 Skipped macroblocks For some macroblocks there are no coded data, that is neither motion vector information nor DCT information is available to the decoder. These macroblocks are called skipped macroblocks and are indicated when the macroblock-address-increment is greater than 1. ... In B-pictures, the skipped macroblock is defined to have the same macroblock-type (forward, backward, or both motion vectors) as the prior macroblock, differential motion vectors equal to zero, and no DCT coefficients. In a B-picture, a skipped macroblock shall not follow an intra-coded macroblock.”
23[a] the method further comprising deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment; and	MPEG-1, as evidenced by the example citations below, discloses or renders obvious deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment. <i>See, e.g.,</i> <i>See limitation 1[b].</i> Section 2.4.4.4. “2.4.4.4 Skipped macroblocks For some macroblocks there are no coded data, that is neither motion vector information nor DCT information is available to the decoder. These macroblocks are called skipped macroblocks and are indicated when the macroblock-address-increment is greater than 1. ...

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	In B-pictures, the skipped macroblock is defined to have the same macroblock-type (forward, backward, or both motion vectors) as the prior macroblock, differential motion vectors equal to zero, and no DCT coefficients. In a B-picture, a skipped macroblock shall not follow an intra-coded macroblock.”
23[b] the predicted non-zero motion vector is assigned for the skip coding mode of the first segment; and	MPEG-1, as evidenced by the example citations below, discloses or renders obvious the predicted non-zero motion vector is assigned for the skip coding mode of the first segment. <i>See, e.g.,</i> <i>See limitation 1[a].</i> <i>See limitation 1[b].</i>
23[c] the prediction for the first segment is formed by a motion compensated prediction with respect to the reference frame based at least in part on the predicted non-zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious the prediction for the first segment is formed by a motion compensated prediction with respect to the reference frame based at least in part on the predicted non-zero motion vector. <i>See, e.g.,</i> <i>See limitation 1[c].</i>
24. A method according to claim 1, wherein if the second segment has a zero motion vector and the second segment is predicted using motion-compensated	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	<i>See, e.g.,</i> <i>See claim 2.</i> <i>See limitation 1[b].</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 6.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b]. Additionally, a POSITA would understand and find it obvious that combining MPEG-1's teaching that the second segment is a "prior macroblock" (see, e.g., MPEG-1, Section 2.4.4.4) with Hwang's teaching of processing a search block to select its final motion vector, and saving that final motion vector in a motion vector memory 110 so that it may be used in the subsequent processing of neighboring search block. Combining MPEG-1 and Hwang teaches or suggests that the previously processed search block associated with the zero vector (the recited "second segment") "is predicted using motion-compensated prediction from the reference picture."</i>
25. A method according to claim 1, wherein if the second	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 2.</i> <i>See limitation 1[b].</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 6.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b]. Additionally, a POSITA would understand that MPEG-1 and Hwang are agnostic as to whether the reference frame is “immediately preceding” the current frame, and would understand that the reference frame may be immediately preceding the current frame.</i>
28 A method according to	MPEG-1, as evidenced by the example citations below, discloses or renders obvious deriving the

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
claim 1, further comprising: deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment.	predicted non-zero motion vector based at least in part on the motion vector of the second segment. <i>See, e.g.,</i> <i>See limitation 1[b].</i>
29. A method according to claim 1, further comprising: deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment and motion vector of a third segment neighboring the first segment.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment and motion vector of a third segment neighboring the first segment. <i>See, e.g.,</i> <i>See limitation 1[b].</i>
30. A method according to claim 1, wherein no residual information is provided for the first segment in the encoded bitstream.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that no residual information is provided for the first segment in the encoded bitstream. <i>See, e.g.,</i> Section 2.1.131. “ 2.1.131 skipped macroblock [video]: A macroblock for which no data are stored.” Section 2.4.4.4. “ 2.4.4.4 Skipped macroblocks

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	For some macroblocks there are no coded data, that is neither motion vector information nor DCT information is available to the decoder. These macroblocks are called skipped macroblocks and are indicated when the macroblock-address-increment is greater than 1. In I-pictures, all macroblocks shall be coded and there shall be no skipped macroblocks. In P-pictures, the skipped macroblock is defined to be a macroblock with a reconstructed motion vector equal to zero and no DCT coefficients. In B-pictures, the skipped macroblock is defined to have the same macroblock-type (forward, backward, or both motion vectors) as the prior macroblock, differential motion vectors equal to zero, and no DCT coefficients. In a B-picture, a skipped macroblock shall not follow an intra-coded macroblock.”
32. A method according to claim 7, wherein if the second segment has a zero motion vector, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See claim 6.</i> <i>For further example, a POSITA would have understood that MPEG-1’s decoding method performs the same steps as the encoding method.</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See claim 6.</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>Rationale for combining MPEG-1 and Hwang</i> <i>See limitation 1[b].</i>
34[preamble] A method according to claim 7, wherein if the second segment has a non-zero motion vector,	MPEG-1, as evidenced by the example citations below, discloses or renders obvious the second segment has a non-zero motion vector. <i>See, e.g.,</i> <i>See limitation 23[preamble].</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i>
34[a] the method further comprising deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment; and	MPEG-1, as evidenced by the example citations below, discloses or renders obvious deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment. <i>See, e.g.,</i> <i>See limitation 23[a].</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i>
34[b] the predicted non-zero	MPEG-1, as evidenced by the example citations below, discloses or renders obvious the predicted non-

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
motion vector is assigned for the skip coding mode of the first segment; and	zero motion vector is assigned for the skip coding mode of the first segment. <i>See, e.g.,</i> <i>See limitation 23[b].</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i>
34[c] the prediction for the first segment is formed by a motion compensated prediction with respect to the reference frame based at least in part on the predicted non-zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious the prediction for the first segment is formed by a motion compensated prediction with respect to the reference frame based at least in part on the predicted non-zero motion vector. <i>See, e.g.,</i> <i>See limitation 23[c].</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i>
36. A method according to claim 7, wherein if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from the reference	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	<i>See claim 24.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 24.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b].</i>
39 A method according to claim 7, further comprising: deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment. <i>See claim 28.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
40 A method according to claim 7, further comprising: deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment and motion vector of a third segment neighboring the first segment.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious deriving the predicted non-zero motion vector based at least in part on the motion vector of the second segment and motion vector of a third segment neighboring the first segment. <i>See claim 29.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i>
41. A method according to claim 7, wherein no residual information is provided for the first segment in the encoded bitstream.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that no residual information is provided for the first segment in the encoded bitstream. <i>See claim 30.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i>
43. A method according to claim 7, wherein if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See claim 25.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	<i>same steps as the encoding method.</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 25.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b].</i>
44[preamble] An encoder according to claim 10, wherein if the second segment has a non-zero motion vector,	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that the second segment has a non-zero motion vector. <i>See, e.g.,</i> <i>See limitation 23[preamble].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>
44[a] the motion estimation block is further arranged to derive the predicted non-zero motion vector based at least in part on the motion vector of the second segment; and	MPEG-1, as evidenced by the example citations below, discloses or renders obvious the motion estimation block is further arranged to derive the predicted non-zero motion vector based at least in part on the motion vector of the second segment. <i>See, e.g.,</i> <i>See limitation 23[a].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>
44[b] the predicted non-zero motion vector is assigned for the skip coding mode for the first segment; and	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that the predicted non-zero motion vector is assigned for the skip coding mode for the first segment. <i>See, e.g.,</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>See limitation 23[b].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>
44[c] the prediction for the first segment is formed by a motion compensated prediction with respect to the reference frame based at least in part on the predicted non-zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that the prediction for the first segment is formed by a motion compensated prediction with respect to the reference frame based at least in part on the predicted non-zero motion vector. <i>See, e.g.,</i> <i>See limitation 23[c].</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
47. An encoder according to claim 10, wherein the motion estimation block further arranged to derive the predicted non-zero motion vector based at least in part on the motion vector of the second segment.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that the motion estimation block further arranged to derive the predicted non-zero motion vector based at least in part on the motion vector of the second segment. <i>See claim 28.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>
48. An encoder according to claim 10, wherein the motion estimation block further arranged to derive the predicted non-zero motion vector based at least in part on the motion vector of the second segment and motion vector of a third segment neighboring the first segment.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that the motion estimation block further arranged to derive the predicted non-zero motion vector based at least in part on the motion vector of the second segment and motion vector of a third segment neighboring the first segment. <i>See claim 29.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>
49. An encoder according to claim 10, wherein no residual information is provided for the first segment in the encoded bitstream.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that no residual information is provided for the first segment in the encoded bitstream. <i>See claim 30.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>
51. An encoder according to claim 10, wherein if the second segment has a zero motion vector, the zero motion vector is assigned to the skip coding mode of the	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	<i>See claim 6.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 6.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b].</i>
52. An encoder according to claim 10, wherein if the second segment has a zero motion vector and the second segment is predicted using motion-compensated	MPEG-1, as evidenced by the example citations below, discloses or renders obvious if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	<i>See claim 24.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i> Hwang, as evidenced by the example citations below, discloses or renders obvious if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 24.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b].</i>
53. An encoder according to claim 10, wherein if the second segment has a zero	MPEG-1, as evidenced by the example citations below, discloses or renders obvious if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See claim 25.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious an encoder. <i>See, e.g.,</i> <i>See limitation 10[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i> Hwang, as evidenced by the example citations below, discloses or renders obvious if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 25.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
54. A decoder according to claim 16, wherein if the second segment has a zero motion vector, the zero-motion vector is assigned to the skip coding mode for the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector, the zero-motion vector is assigned to the skip coding mode for the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 6.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a decoder. <i>See, e.g.,</i> <i>See claim 16[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 6.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>See limitation 1[b].</i>
58. A decoder according to claim 16, wherein the motion estimation block further arranged to derive the predicted non-zero motion vector based at least in part on the motion vector of the second segment.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that the motion estimation block further arranged to derive the predicted non-zero motion vector based at least in part on the motion vector of the second segment. <i>See, e.g., See claim 28.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a decoder. <i>See, e.g., See claim 16[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>
59. A decoder according to claim 16, wherein the motion estimation block further arranged to derive the predicted non-zero motion vector based at least in part on the motion vector of the second segment and motion	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that the motion estimation block further arranged to derive the predicted non-zero motion vector based at least in part on the motion vector of the second segment and motion vector of a third segment neighboring the first segment. <i>See claim 29.</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
vector of a third segment neighboring the first segment.	<i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a decoder. <i>See, e.g.,</i> <i>See limitation 16[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>
60. A decoder according to claim 16, wherein no residual information is provided for the first segment in an encoded bitstream.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that no residual information is provided for the first segment in an encoded bitstream. <i>See, e.g.,</i> <i>See claim 30.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a decoder. <i>See, e.g.,</i> <i>See claim 16[preamble].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<u>Rationale for combining MPEG-1 and AAPA</u> <i>See claim 10[preamble].</i>
62. A decoder according to claim 16, wherein if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See claim 24.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i> <i>AAPA, as evidenced by the example citations below, discloses or renders obvious a decoder.</i> <i>See, e.g.,</i> <i>See claim 16[preamble].</i> <u>Rationale for combining MPEG-1 and AAPA</u> <i>See claim 10[preamble].</i> Hwang, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from the reference picture, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>See, e.g.,</i> <i>See claim 24.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b].</i>
63. A decoder according to claim 16, wherein if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious that if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See claim 25.</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a decoder. <i>See, e.g.,</i> <i>See limitation 16[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	Hwang, as evidenced by the example citations below, discloses or renders obvious if the second segment has a zero motion vector and the second segment is predicted using motion-compensated prediction from a second reference picture immediately preceding the picture second segment belongs to, the zero motion vector is assigned to the skip coding mode of the first segment and the prediction for the first segment is formed with respect to a corresponding segment of the reference frame associated with the zero motion vector. <i>See, e.g.,</i> <i>See claim 25.</i> <u><i>Rationale for combining MPEG-1 and Hwang</i></u> <i>See limitation 1[b]..</i>
64. A decoder according to claim 16, wherein no further motion vector information for the first segment is retrieved from an encoded bitstream.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious no further motion vector information for the first segment is retrieved from an encoded bitstream. <i>See limitation 1[d].</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i> AAPA, as evidenced by the example citations below, discloses or renders obvious a decoder.

ASSERTED CLAIMS	PRIOR ART REFERENCE: MPEG-1, Hwang, AAPA
	<i>See, e.g.,</i> <i>See limitation 16[preamble].</i> <u><i>Rationale for combining MPEG-1 and AAPA</i></u> <i>See claim 10[preamble].</i>
65. A method according to claim 7, wherein no further motion vector information for the first segment is retrieved from the encoded bitstream.	MPEG-1, as evidenced by the example citations below, discloses or renders obvious no further motion vector information for the first segment is retrieved from an encoded bitstream. <i>See limitation 1[d].</i> <i>For further example, a POSITA would have understood that MPEG-1's decoding method performs the same steps as the encoding method.</i>