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**Takayanagi**

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(54) **WIDE DYNAMIC RANGE LINEAR-AND-LOG ACTIVE PIXEL**

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 498 days.

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(51) **Int. Cl.**

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**H01L 31/113** (2006.01)

**H04N 9/73** (2006.01)

**H04N 3/14** (2006.01)

**H04N 5/335** (2006.01)

(52) **U.S. Cl.** ..... **348/223.1**; 348/294; 348/301; 348/308; 257/292

(58) **Field of Classification Search** ..... 348/223.1, 348/294, 300, 301, 302, 308, 655; 257/291, 257/292

See application file for complete search history.

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*Primary Examiner*—John M. Villecco

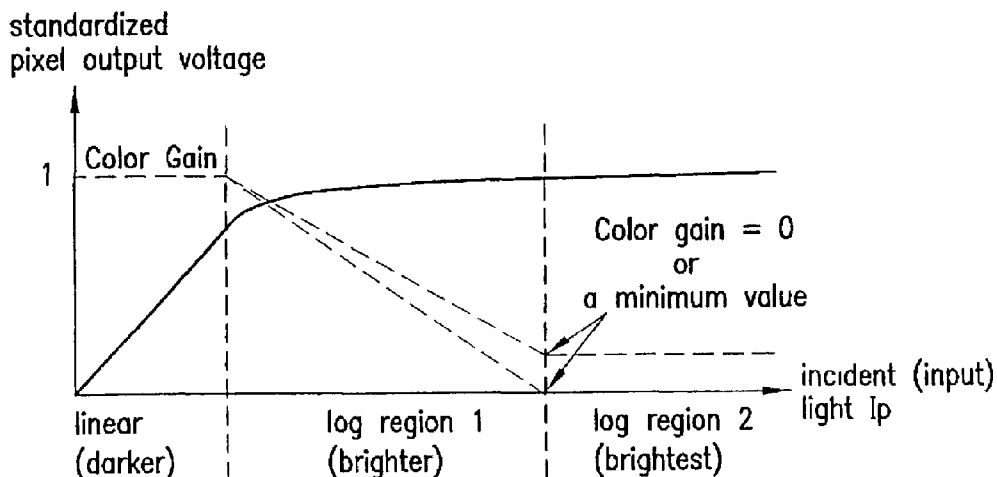
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(57) **ABSTRACT**

A pixel circuit having an improved dynamic range is disclosed. When incoming light detected by the photodiode is strong, the accumulated (integrated) charge on a signal capacitor becomes large. To compensate, the excess signal component becomes compressed and the pixel circuit begins operating in logarithmic rather than linear mode. In this way, the circuit can achieve a higher dynamic range more closely resembling the image sensing properties of the human eye.

**6 Claims, 5 Drawing Sheets**



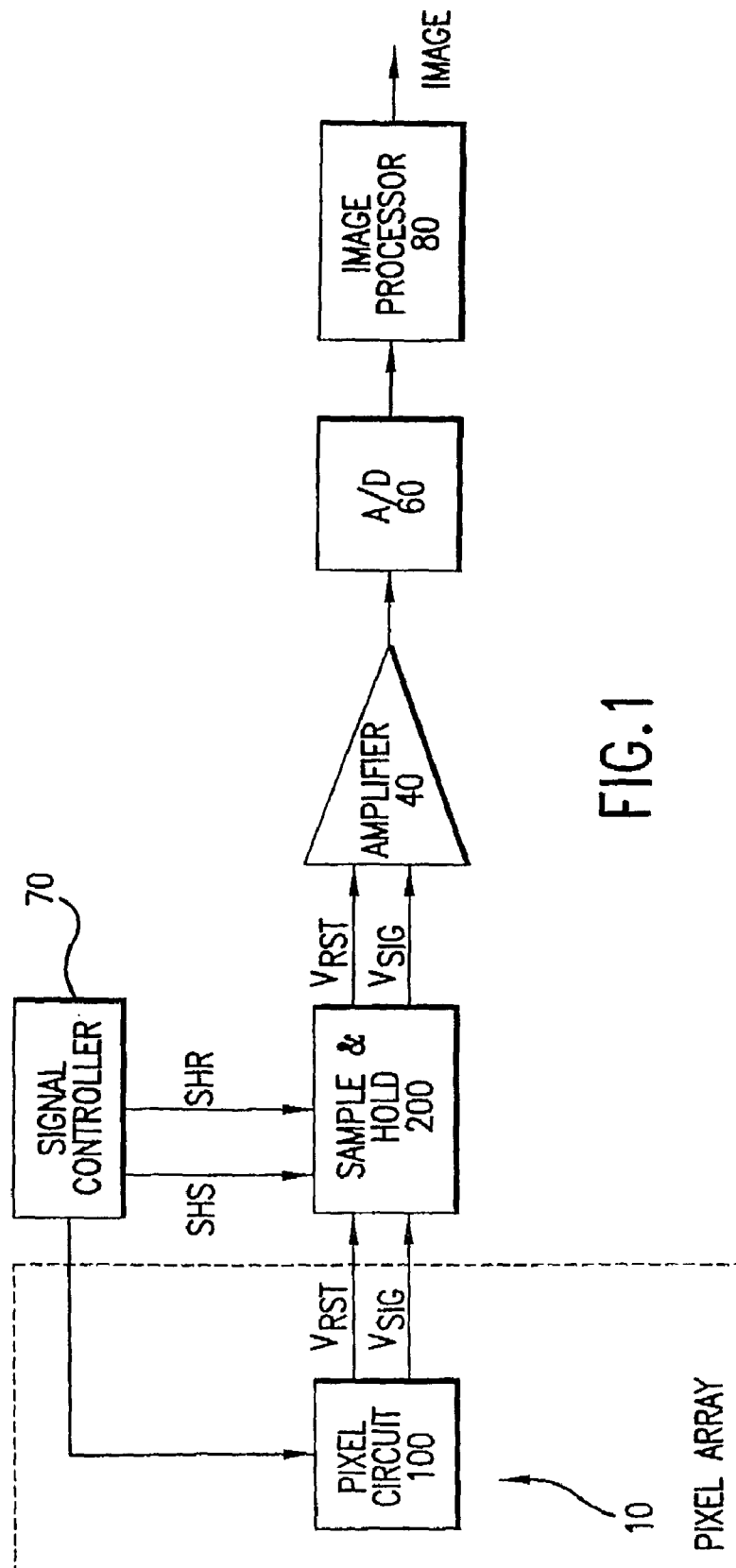
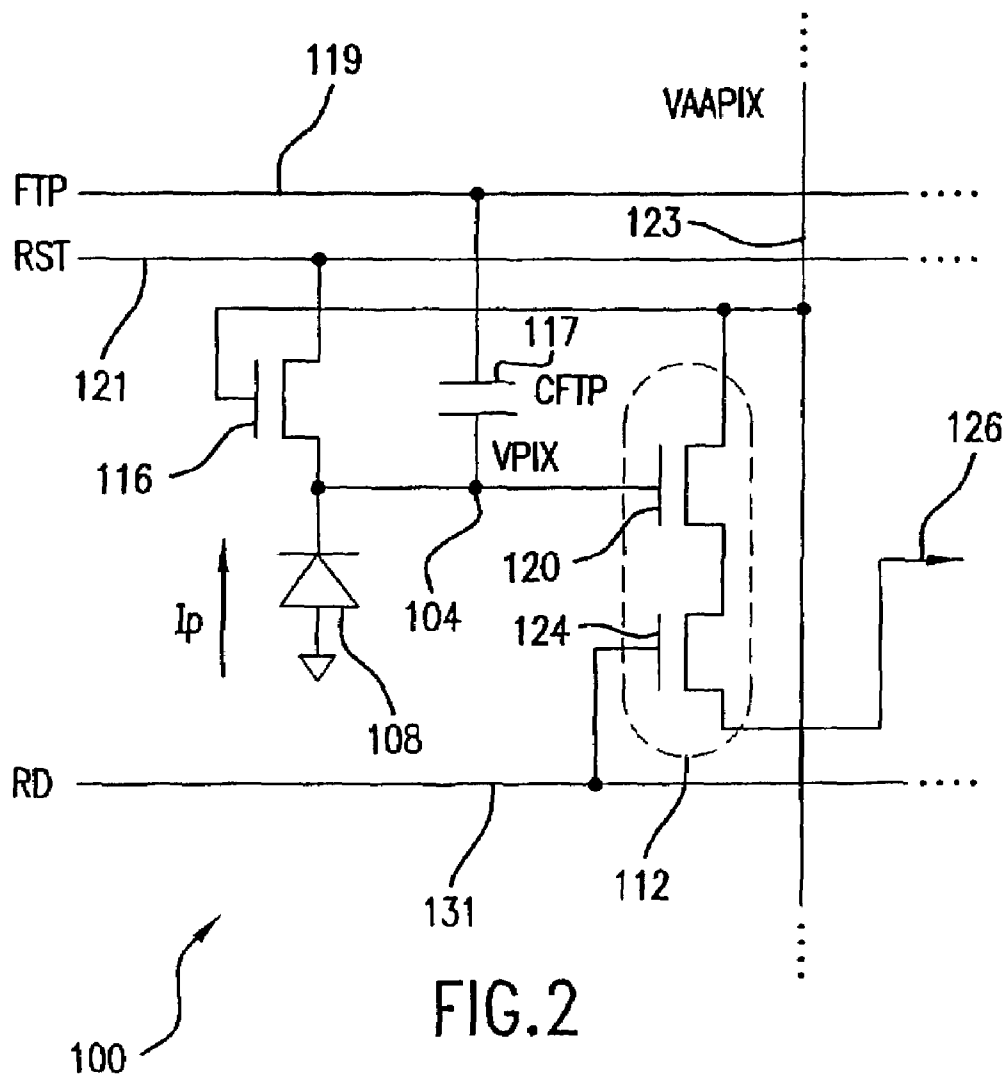


FIG. 1



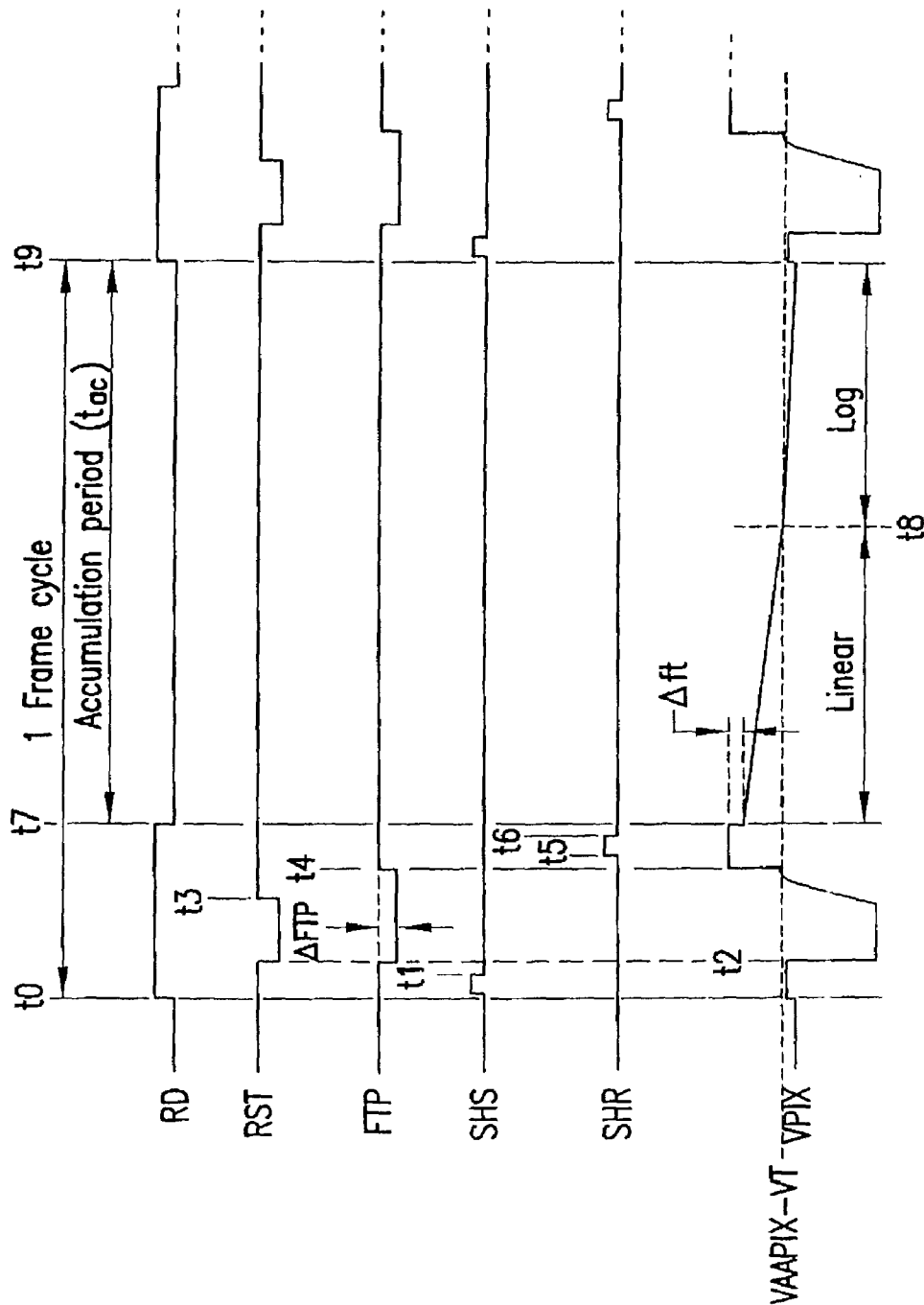


FIG. 3

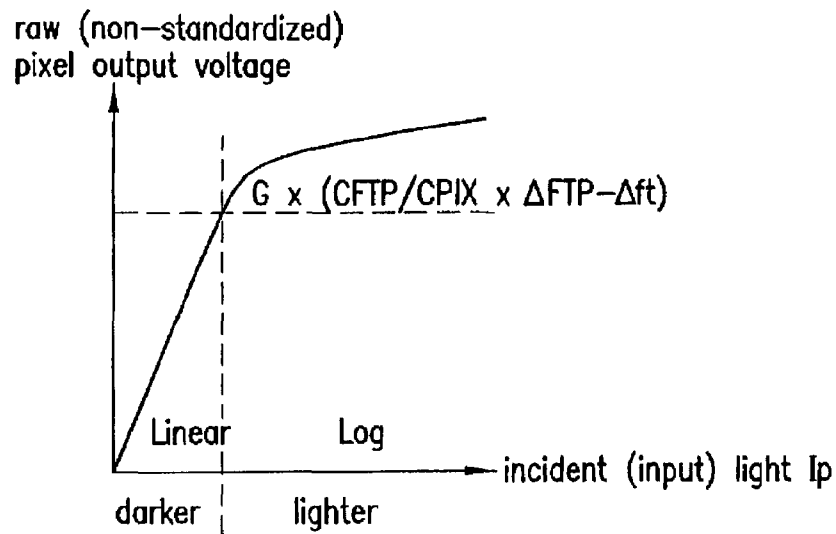


FIG. 4

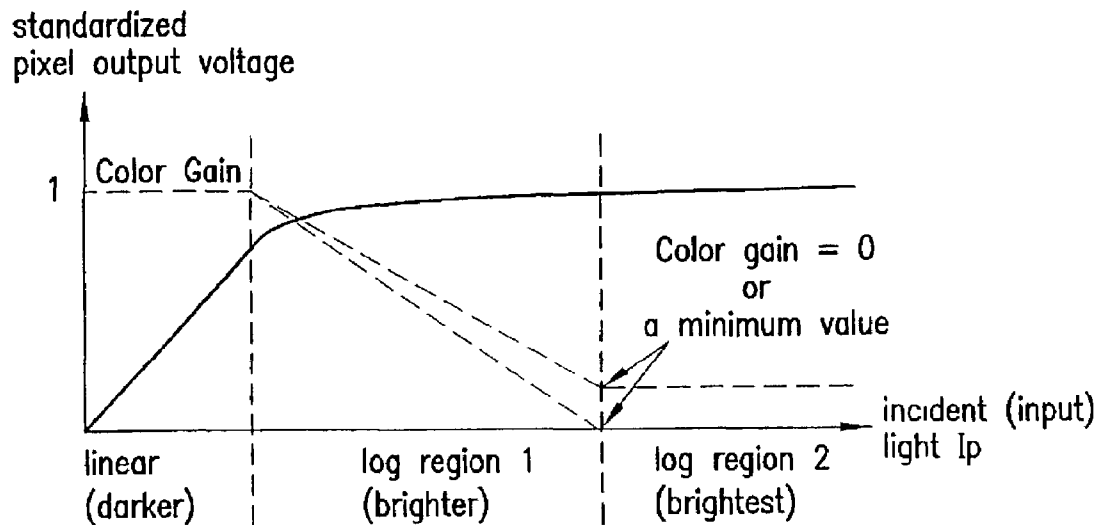


FIG. 5

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