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United States Patent [19]

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Johnson et al.

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[54] **IMAGE SCANNER WITH CALIBRATION MECHANISM TO OBTAIN FULL DYNAMIC RANGE AND COMPENSATED LINEAR OUTPUT**

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[57] ABSTRACT

A calibrated scanner is disclosed. The calibrated scanner includes a sensor board with a Charge Coupled Device (CCD) having two output signals. The sensor board also includes two offset devices, a coarse offset and a fine offset, the coarse offset being connected to the two output signals, the fine offset being connected to one of the output signals. The offsets are adjusted to provide a nonclipping DC bias for the two output signals. The sensor board also includes two gain devices, one gain device being attached to each output signal. The gain devices are adjusted to balance the two output signals. After these adjustments, the saturation level of the CCD is determined. The saturation level information is then used in readjusting the gain and offset devices. After this calibration, a linear correction may be applied to the output signal of the sensor board. The linear correction is accomplished by determining dark and light values of the sensor board. These values, along with ideal dark and light values, are used to solve two linear equations to determine M and b values. The M and b values are then used to provide direct linear correction to the data leaving the sensor board.

[21] Appl. No.: **658,177**

[22] Filed: **Feb. 20, 1991**

[51] Int. Cl.⁵ **H04N 1/46**

[52] U.S. Cl. **358/406; 358/504; 358/512; 358/483; 358/513; 358/520; 358/479**

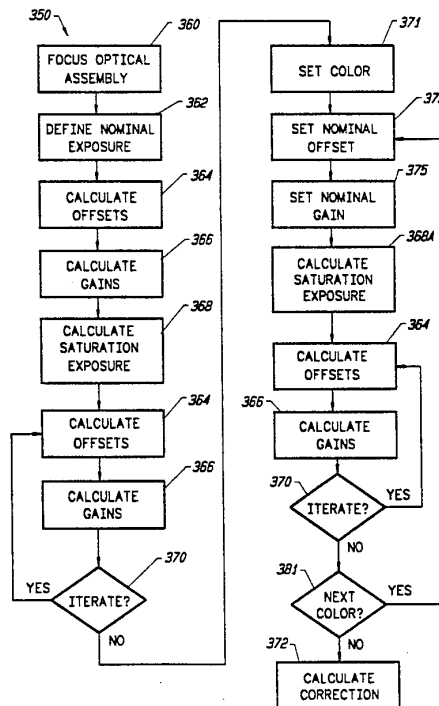
[58] Field of Search **358/406, 76, 479, 482, 358/483, 487, 213.15, 213.16, 213.18, 213.19, 213.27, 213.28, 213.31, 446, 512, 504, 513, 514, 518, 520; H04N 1/46**

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12 Claims, 11 Drawing Sheets



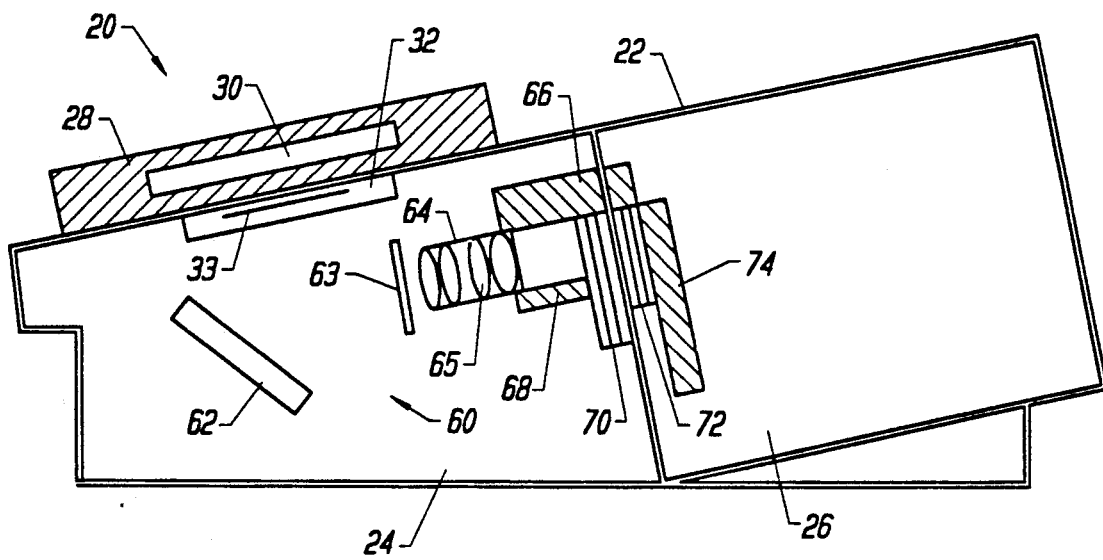


FIG. 1

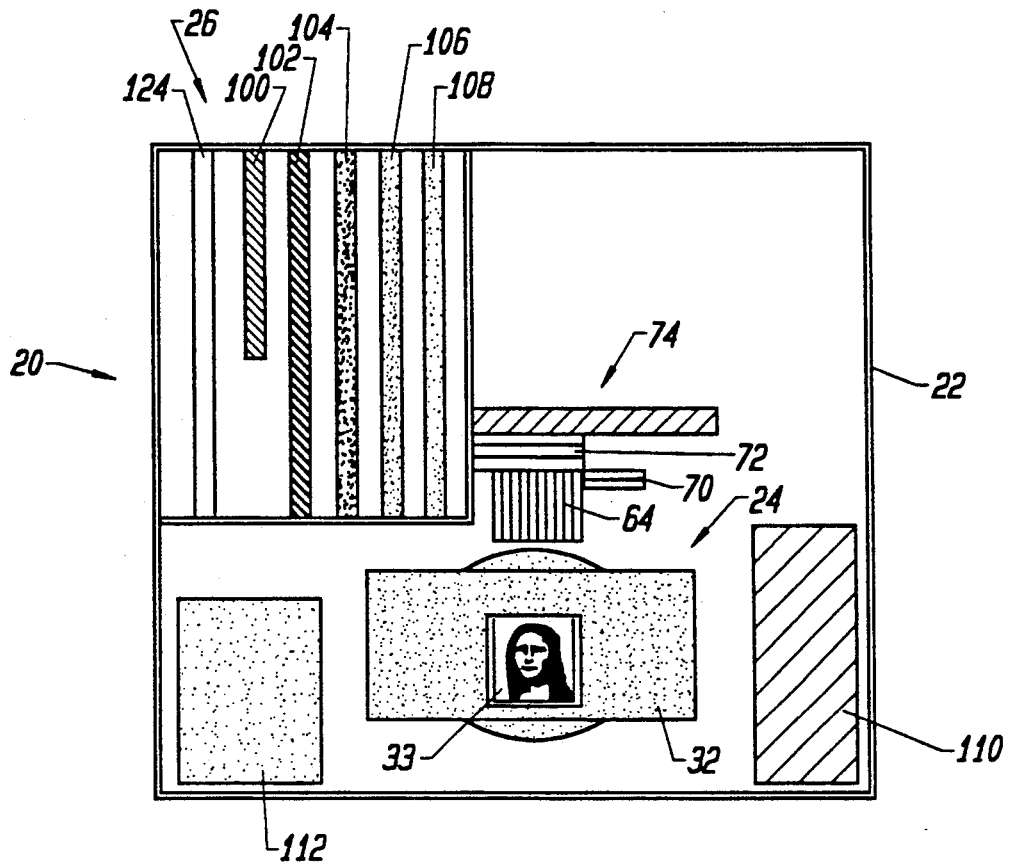
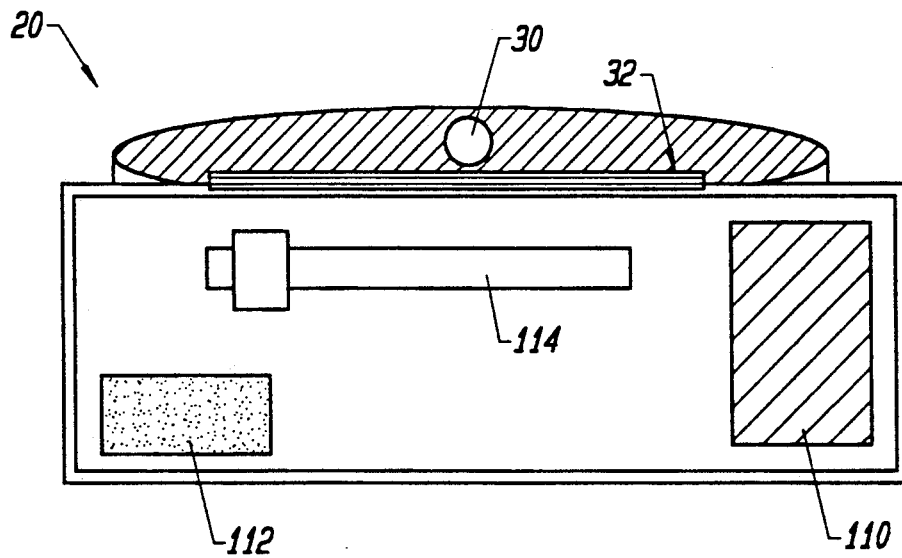


FIG. 2



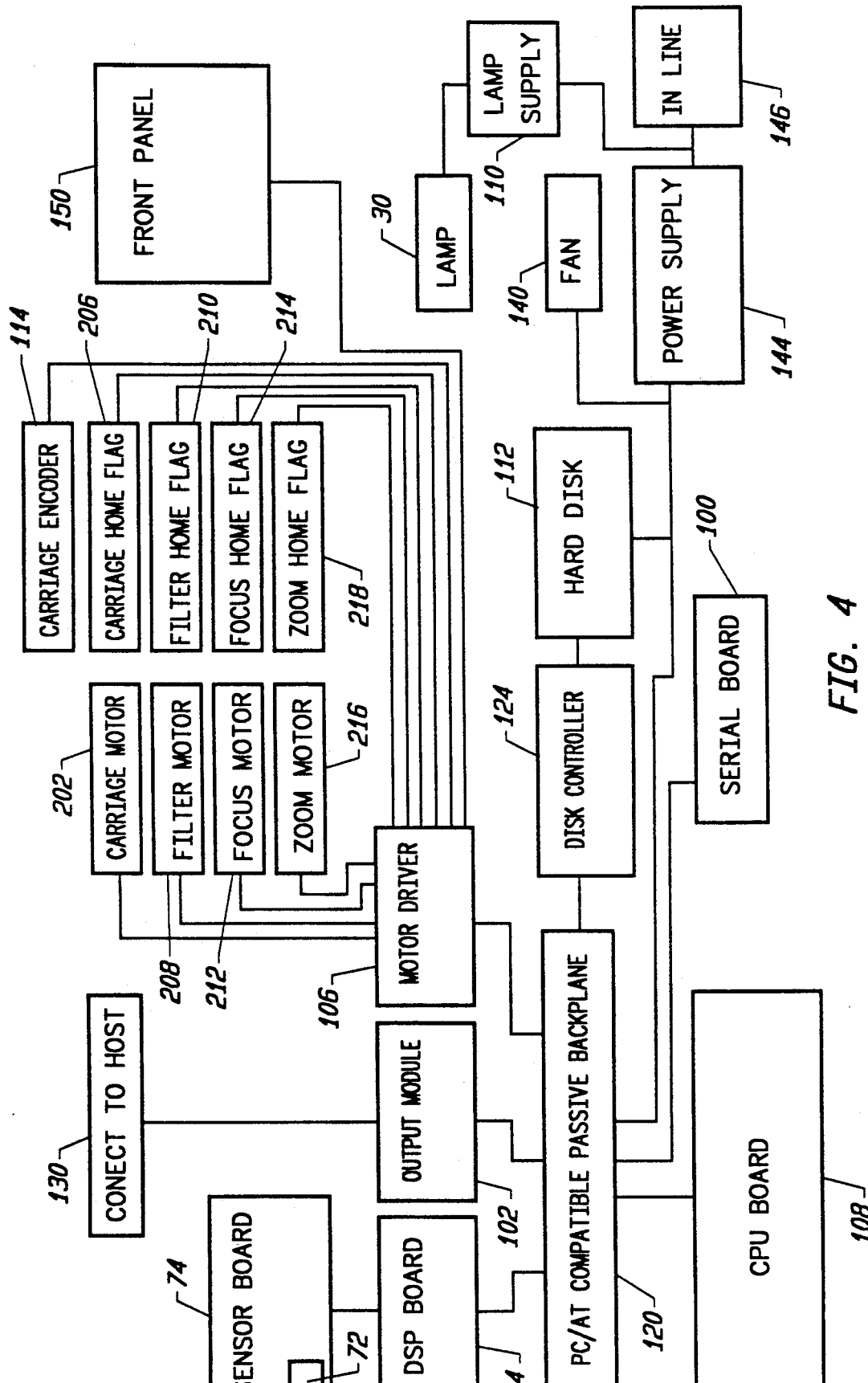


FIG. 4

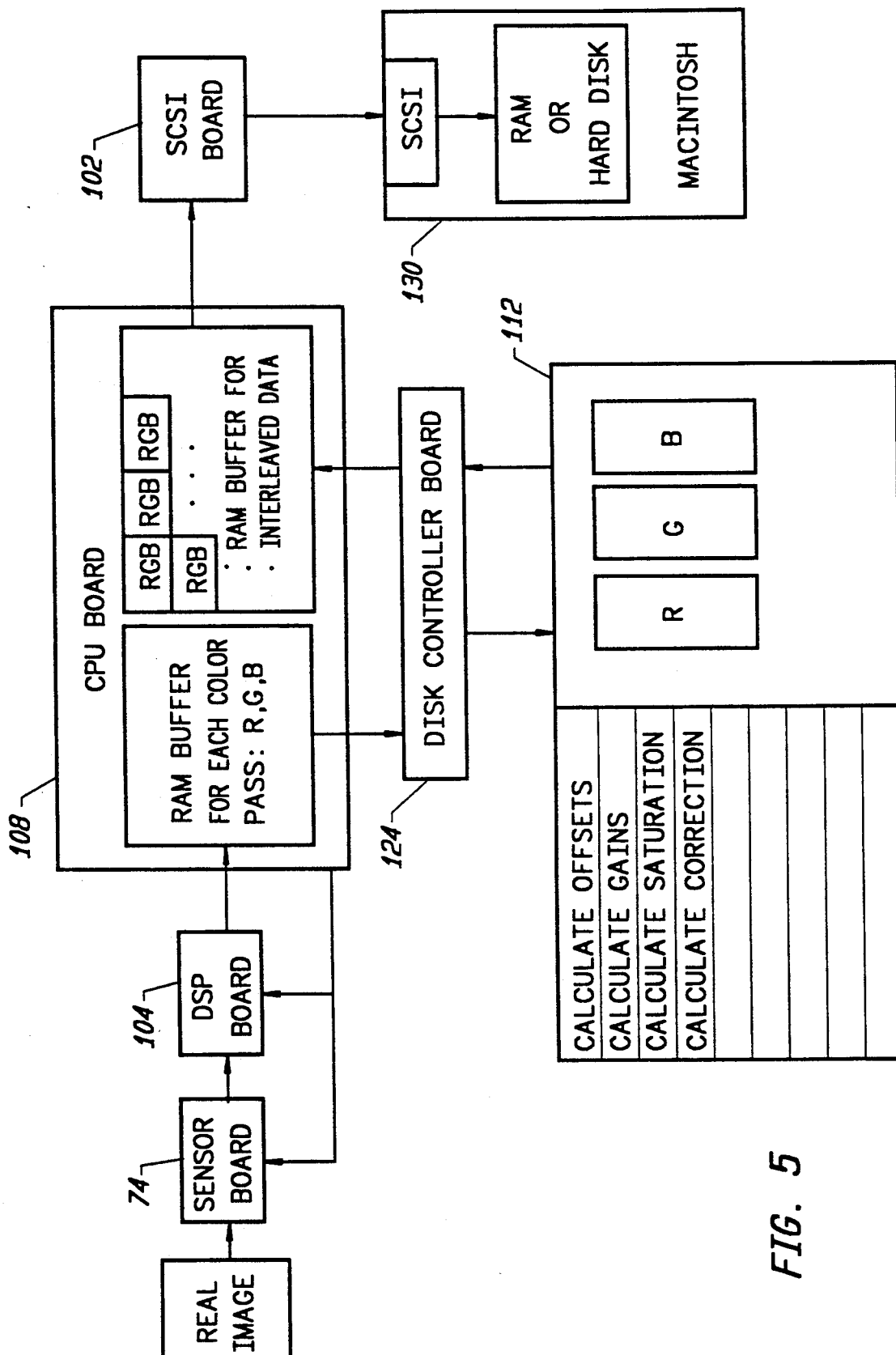


FIG. 5

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