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Greene et al.

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(54) **CORRECTION METHODS FOR BRIGHTNESS IN ELECTRONIC DISPLAY**

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(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **09/173,468**

(22) Filed: **Oct. 14, 1998**

Related U.S. Application Data

(63) Continuation of application No. 08/636,604, filed on Apr. 23, 1996.

(51) **Int. Cl.**[7] **G09G 5/10**
(52) **U.S. Cl.** **345/147**; 345/207; 345/89; 345/88
(58) **Field of Search** 345/87, 103, 98, 345/100, 147, 1–2, 3, 92, 903, 207, 89, 88, 63, 431, 199; 348/383, 757, 687, 631, 607, 609; 382/167, 162

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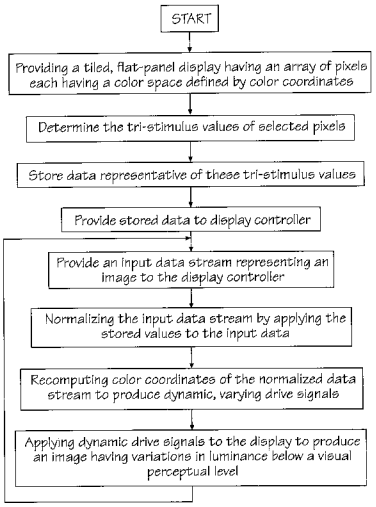
(57) **ABSTRACT**

The present invention features methods and apparatus for the correction of spatial non-uniformities in brightness that arise from materials, manufacturing, operational and lighting parameter variations in electronic color, flat-panel displays. The methods apply both to gradual non-uniformities usually found in monolithic displays as well as to abrupt variations present in displays composed of a multitude of tiles. Corrections are performed on the electronic drive signals used to control the brightness of selected display pixels. Parameters required for these corrections are acquired via brightness measurements over selected pixels and stored after suitable transformations. The stored parameters are then used to scale and/or interpolate drive signals in real time. Corrections are performed such that any remaining gradual and abrupt brightness non-uniformities fall below the detectable threshold under the intended viewing conditions. The correction methods can also be used for correcting brightness non-uniformities arising from uneven aging of the display. Apparatus for an automatic self-calibrating function is also described.

26 Claims, 6 Drawing Sheets



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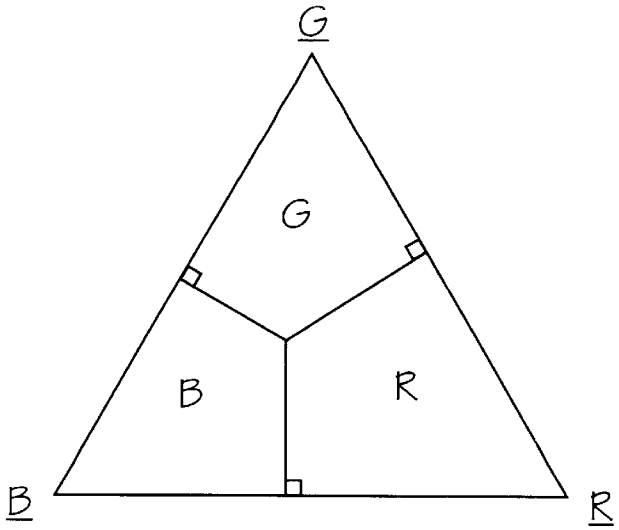

Figure 1

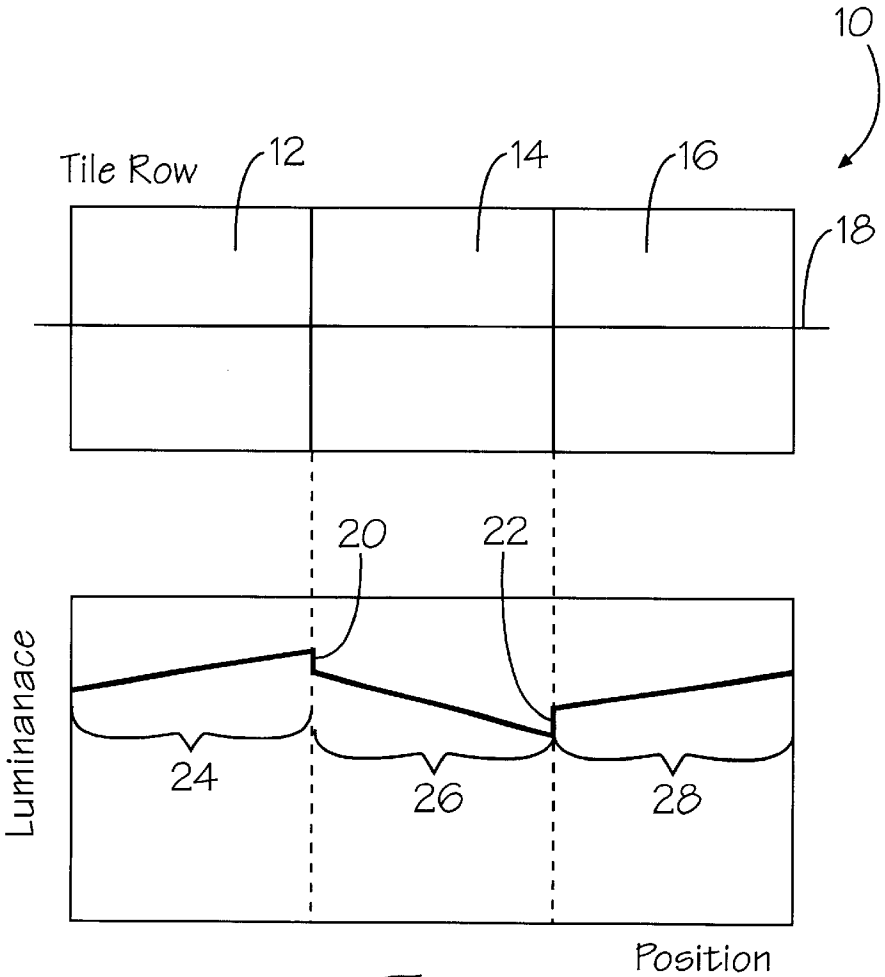

Figure 2

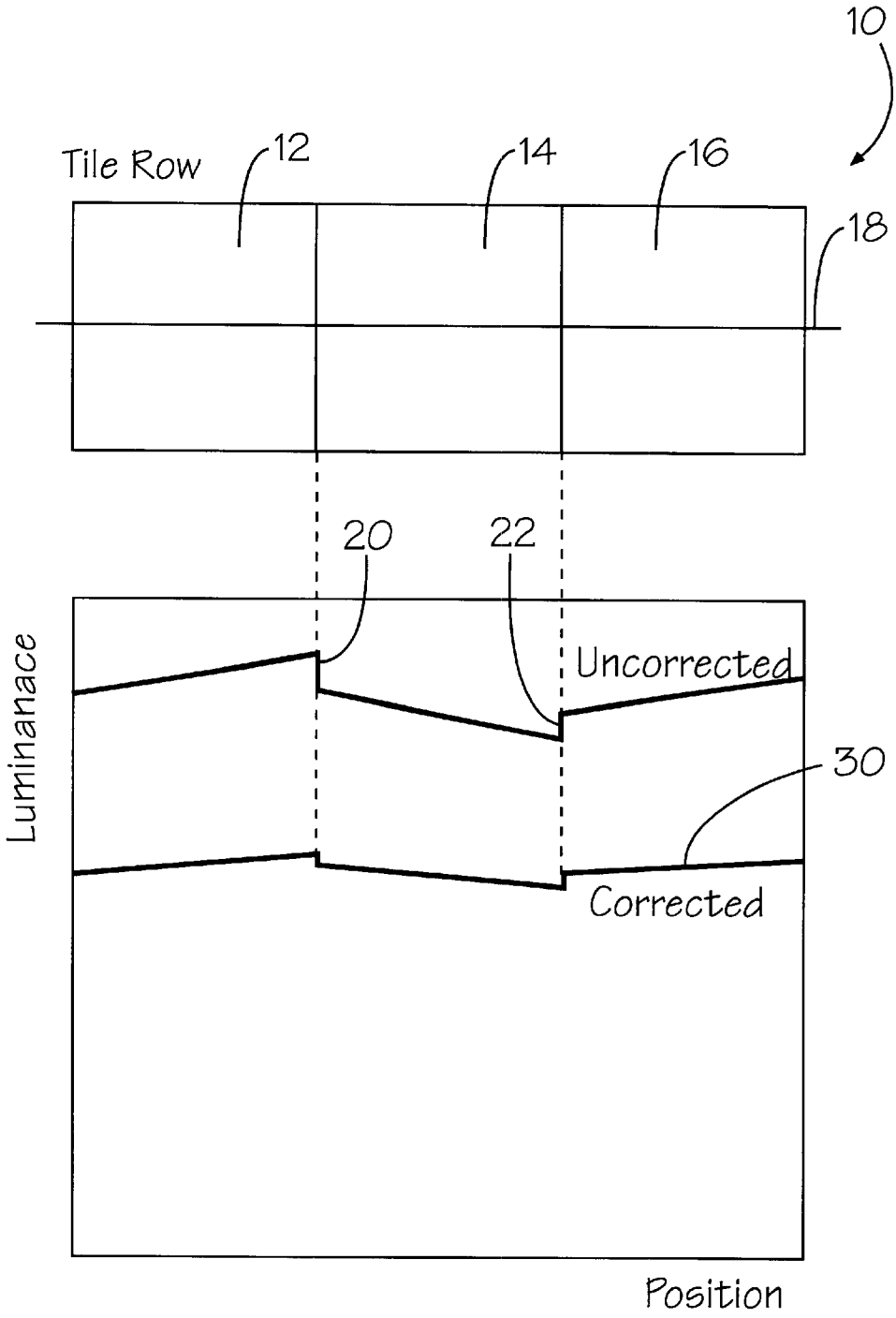

Figure 3

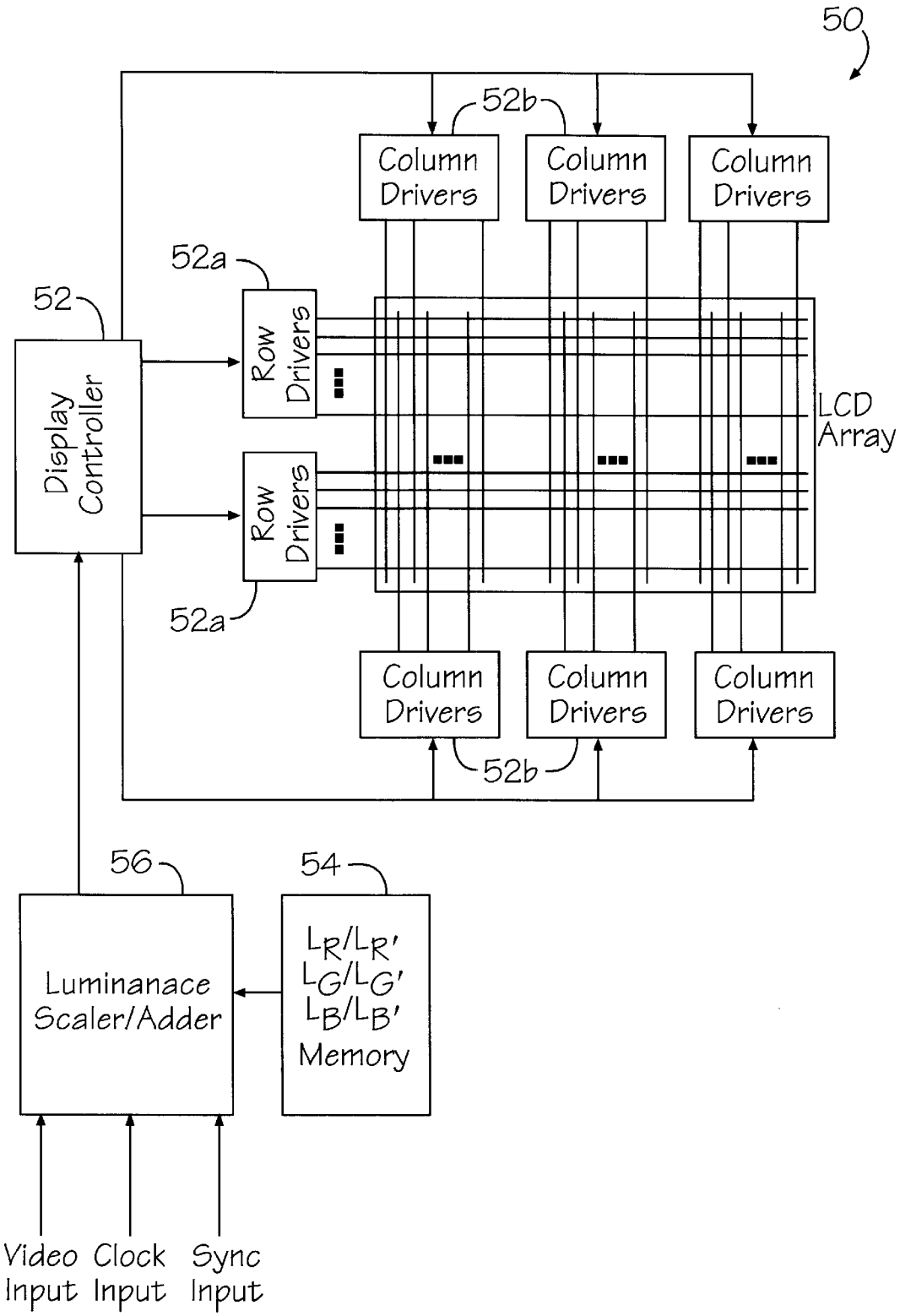

Figure 4

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