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(54) **OPTICAL IMAGE SCANNER WITH INTERNAL MEASUREMENT OF POINT-SPREAD FUNCTION AND COMPENSATION FOR OPTICAL ABERRATIONS**

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(57) **ABSTRACT**

An image scanner uses optical targets within the scanner to characterize imperfections of a lens system and to partially compensate for the imperfections using digital image processing. In one sample embodiment, a series of two-dimensional optical targets are placed outside the document scanning area. Each individual target is suitable for obtaining an estimate of the point-spread function for a small segment of the scan line. Each point-spread function is then used to compute a convolution kernel for the corresponding segment of the scan line. Alternatively, each point-spread function may be used in an iterative solution for a modified image. In an alternative embodiment, a two-dimensional known random pattern is provided for a target. Cross-correlation of a portion of the known random pattern with the scanned image of the same portion of known random pattern provides an estimate of the point-spread function for the portion of the scan line corresponding to the portion of the known random pattern. Providing a series of targets or continuous random target over the width of the scan line, within the scanner, enables determination of the point-spread function as a function of position for an assembled lens, at the humidity and temperature appropriate for the scan. As a result, a smaller, lower cost lens can be used and some the lens aberrations can be removed from the final scanned image.

**8 Claims, 3 Drawing Sheets**

