Numerous designs exist for camera viewfinders. Because of cost considerations, however, only two types of viewfinders are found in low-price single-use or disposable cameras: those that use a two-lens reverse-Galilean design and those that use an open hole. Neither type provides accurate framing information because of the out-of-focus close edge of the front window.

In 1928, Lieuwe Van Albada invented a viewfinder that occupies the same physical space. It consists of a variation of the refractive reverse-Galilean design but focuses a frame line using a superimposed reflective design similar to that of a mirror telescope. The bright frame and spherical mirror are coated onto the lenses of a reverse-Galilean viewfinder. This is a far better design than that of the standard reverse-Galilean, but due to the cost of the lenses, metallization, and assembly, it is not used in disposable cameras.

Only the perimeter of the Albada viewfinder is used for the reflective optics—the center of the lenses does not help form an image of the projected frame. In other words, the image of the projected frame would be unaffected even if a huge hole were drilled through the center of the viewfinder. Further, the image quality of the directly viewed scene would actually be improved by removing the two lenses, with their familiar internal reflections and color fringing, keeping in mind the axiom that the best optics are the ones you leave out.

The refractive optics that form the reduced image of the scene in the reverse-Galilean viewfinder are identical to those of the Albada viewfinder. As a result, the front window of these viewfinders can be slightly smaller than that of an open-hole viewfinder, allowing for a more compact camera design. These refractive viewfinder approaches are used more out of convention than practicality, however, and actually make it harder for the user to recognize subjects in the scene. The benefits of the open-hole approach—providing a frame line, seeing the scene clearly, and eliminating the cost of two lenses—outweigh the detriment of the slight size increase.

Our simple new viewfinder that requires no lenses (see figure 1). The entire viewfinder consists of a hole through which the scene is viewed directly, undiminished in size or quality. A surrounding reflective optical system focuses the frame line (see figure 2). The two optical elements of the viewfinder are molded as part of the front and rear portions of the camera body and flashed with aluminum to improve reflectivity. A rectangular rim of a spherical mirror is molded around the interior surface of the window in the front wall of the camera. Thin radial struts in the window in the rear wall of the camera hold the reticle. Manufacturing cost consists of flashing the two optical surfaces with aluminum. When the camera is assembled, the reticle is positioned with respect to the rim of the spherical mirror to form a focused image of the reticle at the distance of and around the scene.

Due to the relatively large diameter of the human pupil (2 to 7 mm), the reticle and supporting ribs become completely out of focus, unobtrusive as the user’s eye approaches the back of the viewfinder. Simultaneously, a sharply focused image of the frame line appears around the scene.

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