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## Focusing and the Use of Diaphragms.

**I**N cross-heading this article I have followed the order adopted by the publishers in their invitation to competitors, but as correct focusing depends to a large extent on the proper use of diaphragms or stops, I shall reverse the order, and deal with them first.

The photographic lenses in general use are of two classes, single and compound, and with both, stops are employed, although for very different purposes; in the first they are absolutely necessary, while in the second they are only used as a means of improvement.

A single lens, often spoken of as a landscape lens, whether plano-convex or meniscus, cannot be corrected for spherical aberration, the rays from towards the margin coming to a focus nearer the lens than those from towards the centre. The only remedy for this, unless the image were to be received

on a concave plate, is the placing of a stop at some distance in front of the lens, so as to cut off the objectionable marginal rays, and let the picture be formed only of such central pencils as come practically to a focus on one plane.

In the case of a compound lens, spherical aberration has to a large extent been eliminated, so that with a full working aperture, as fixed by the maker, it will, if of a good quality, produce a sharp image, but a sharp image of only such objects as are on one plane; an object at, say, twelve feet being perfectly sharp, while those at ten and fourteen are out of focus. This applies most particularly to portrait lenses, but in a less degree to most compound varieties, is generally spoken of as want of depth of focus, and remedied more or less in proportion to the size of the stop employed. This will be easily understood from a consideration of the fact that the rays from the upper and lower margins of, say, a lens of three inches diameter cross, or come to a focus at, say, a distance of eight inches, at a much wider angle than those from the upper and lower edges of, say, a half-inch stop, something, in fact, like as 20 to 3.