LOCATION OF VIRTUAL IMAGES BY THE PARALLAX METHOD.

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Figure 1 represents the method commonly given in elementary textbooks for locating the image formed by a converging

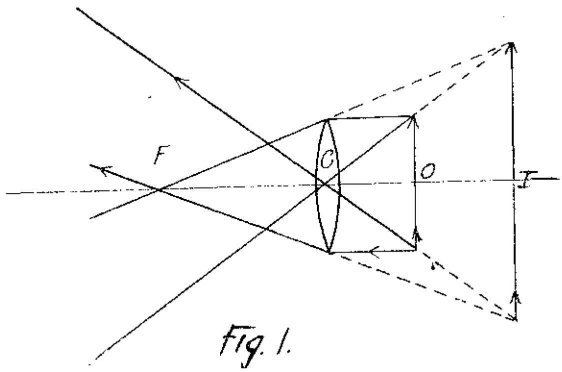

Fig. 1.
Vertical Section

lens of a line object by construction. If we consider a horizontal cross-section of this through the principal axis, we have the conditions for a point object on the principal axis (Fig. 2).

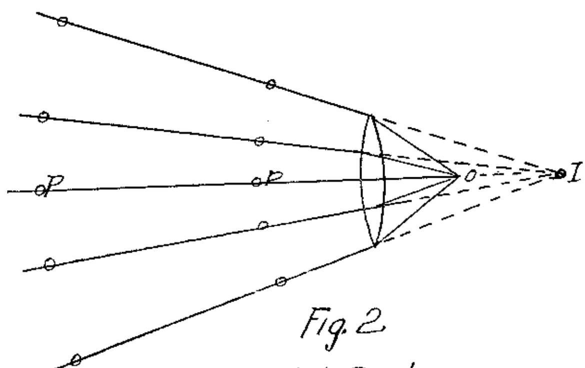

Fig. 2.
Horizontal Section.

Now if a light, wooden bar (B—Fig. 3) is mounted upon a stand of an optical bench (S) back of object (O) and adjusted so that S is in the position of the image O, it is evident from Figure 2 that no matter what the position of the bar, if moved about in a horizontal plane, hat pins (P and p) projecting through holes in the bar will always be in line with the image of O. The bar should be supported by a horizontal rod (R) which may be mounted upon a stand placed at one side of the optical bench.

In practice it is sometimes more convenient to set the stand (S) and adjust the pin representing the object.

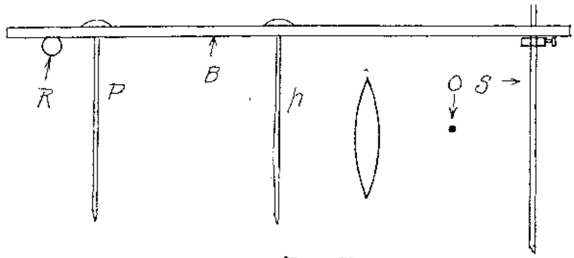

Fig. 3.
Vertical Section.

This method has been found to give good results with medium sized lenses of fair quality—nearly as good as the same lenses give for real images by the parallax method. With the concave mirrors at our disposal, however, the results were not satisfactory.[1] The greatest difficulty with the cheaper grades of lenses and mirrors is that the focal length is not the same for both sides, due to the irregularities of their surfaces.

THE USES OF HELIUM.

The production of helium on an extensive scale which began during the war, when it was proposed to use this gas for filling belloons and dirigibles, has led to considerable discussion as to other ways in which helium can be used. Prof. J. C. McLennan deals at length with this question in a lecture, published in *Nature*. It appears, in the first place, that if helium is used for filling airships the supply from the British Empire would be far from adequate for the British air fleet. One way of economizing it, would be to use it only in compartments adjacent to the engines. As to various industrial uses, it may be used as a filling for thermionic amplifying valves of the ionization type; also for filling tungsten incandescent lamps, especially for signal purposes where rapid dimming is essential, and for producing gas arc lamps in which tungsten terminals are used. Some objections to these uses are pointed out. Nutting has shown that Geissler tubes filled with helium are very suitable, under certain conditions, for light standards in spectrophotometry. Helium is also invaluable in spectroscopy, and for various other laboratory uses. Elihu Thomson has suggested that if divers were supplied with a mixture of oxygen and helium, the rate of expulsion of carbon dioxide from the lungs might be increased, and thus the period of submergence might be considerably lengthened. The widest application of helium, however, appears to be in the field of low temperature research, as liquid helium—and perhaps eventually solid helium—enables one to reach the lowest temperatures attainable by an means. A point of special importance to which Professor McLennan calls attention is that the supplies of natural gas from which helium can be extracted are being rapidly used up; hence it might be well to store a supply of this gas for use in years to come.—[*Scientific American*.

[1]This method was first used by the writer last year at the North Dakota Agricultural College.