A simple single-disc eye mirror : the working ophthalmoscope for the eye specialist and general practitioner, and how to use it / Herman Knapp.

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A SIMPLE SINGLE-DISC EYE MIRROR.

THE WORKING OPHTHALMOSCOPE FOR THE EYE SPECIALIST AND GENERAL PRACTITIONER, AND HOW TO USE IT.*

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The many modifications of Helmholtz's eye mirror in the course of fifty years show that there was at first a tendency to simplification, to make the original instrument handier and more expeditious. Thus the small Liebreich's ophthalmoscope, a concave mirror with a clip behind the sight-hole for a few lenses, mainly destined to correct the physician's myopia, readily became very popular on account of its easy handling and the brilliancy of the fundus image, which never has been surpassed. The inconvenient clip was soon replaced by a disc revolving on the back surface of the mirror, putting a number of correcting lenses successively behind the sight-hole. This has been the most important practical improvement of Helmholtz's instrument. Large demonstration ophthalmoscopes soon followed, from Ruete's instrument to Thorner's, the latter being a marvel in distinctness and brilliancy of the picture, which is free from reflexes and larger than the erect image. All those instruments are not for daily practice.

The advantages of determining objectively the optical condition of the eye led to the construction of the so-called refraction ophthalmoscopes. The new features

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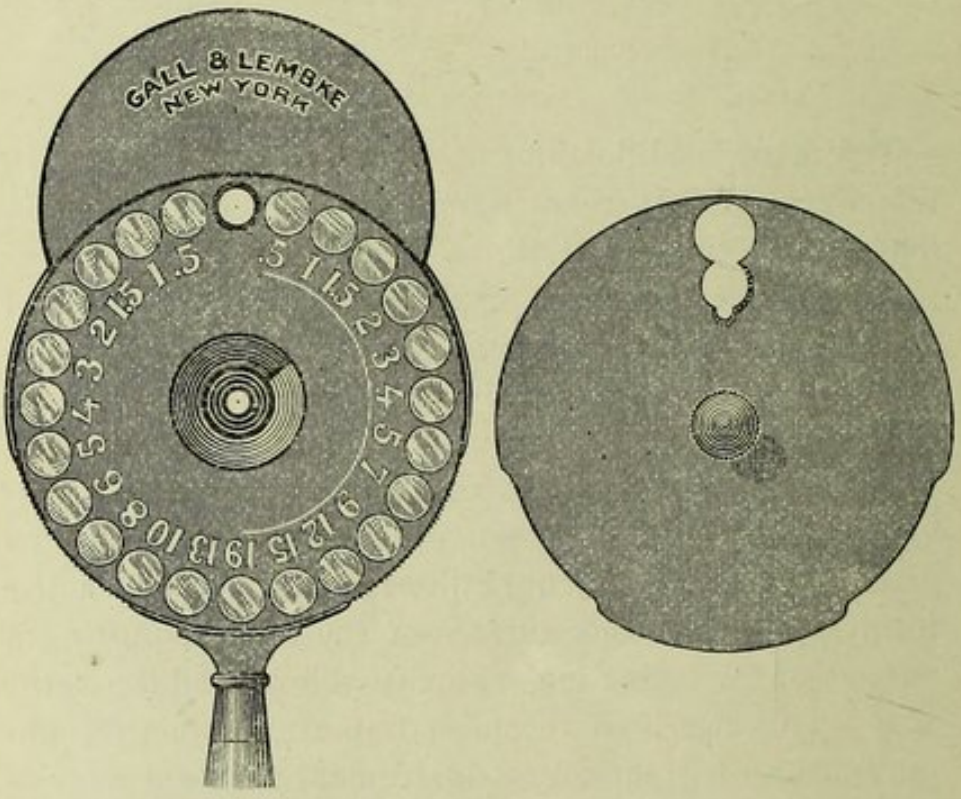
which they introduced were the increase of correcting lenses, to be placed in one or several revolving discs, and the tilting of the mirror by Dr. Wadsworth of Boston, to obviate the disturbing astigmatic effect when the rays of light fall very obliquely on the correcting lenses. Applying those principles in diversified manner has produced a mutlitude of ophthalmoscopes, ingenious in design, complicated in construction, and more or less cumbersome, without surpassing, mostly falling behind, the distinctness and brilliancy of the small Liebreich (he



constructed also a large demonstration-ophthalmoscope), or the simple mirror with a sufficient number of lenses in a Rekoss disc. The latter is the working ophthalmoscope which I have constantly used in private and hospital practice, and I have not found any occasion to replace it by a better one these thirty years.

The concave glass mirror has a sight-hole of 3 mm. The rotating disc has one empty hole and 23 fitted with small lenses, from + 0.50D. to 12D., and from —0.50D. up to — 20D. The rotating disc applies close to the edges of the sight-hole of the mirror, so that the walls formed

by the sight-hole in the mirror and those of the rotating disc which holds the lenses are reduced to the smallest possible dimensions. This is important in order to let enough light through and avoid the unpleasant reflexes from the canal walls. If these walls are well blackened they cast no appreciable reflex on the eye. The blackening is easy, and even if the mirror is constantly used the blackening need not be repeated for many months. I do not usually put my mirror into its case, but carry it in the breast pocket of my coat, constantly taking it in and out. The lenses may gather a little dust, which is easily removed with a camel's hair brush or with a cotton tipped probe every now and then. What soils the glasses and interferes with sight is fat from the fingers and similar sticky substances which prevent the regular refraction of the rays of light. The correcting lenses are, however, well protected, in front by the mirror, behind by a metal plate covering the rotating disc. Two convex lenses, one of 24D., the other of 12D., complete the ophthalmoscope.

The best light for ophthalmoscopy, so far as I know at this time, is an Argand gas burner, or a broad, round oil or kerosene lamp, because both are not too glaring and have the same kind of light which is reflected from the background of the eye, namely, yellowish-red. Electric and Welsbach light have not given me the same satisfaction. Habit plays a great part in this work, and any coming month may bring us a better light for our examinations than gas.

After having made a careful ocular inspection and a cursory functional examination (sight and visual field) of the eye, the patient is taken into a dark room and the anterior part of his eye is examined with oblique light. This is a very important examination, revealing minute abnormities in cornea, anterior chamber, iris, lens and anterior part of the vitreous. After that you examine the patient's eye with the ophthalmoscope by transmitted light, either without or better with a convex lens be-

hind the sight-hole, and see whether you get the normal (uniformly red) fundus reflex or whether it differs from it totally or in one or several parts of the pupil. This reveals abnormities of the refractive media, cornea, lens and vitreous, always using a + lens behind the sight-hole of the mirror, so as to look with relaxed accommodation. For the emmetropic eye this is + 3D. or + 4D., for ametropic eyes their distance glass has to be added. For opacities in the anterior part of the eye a stronger lens is often very useful for distinguishing small objects, such as minute dots on the posterior surface of the cornea, or the fine dots and streaks in primary and secondary cataracts. Unless the eye is very myopic or very hyperopic you see nothing of the background.

The background can be examined in the inverted or in the erect image. I have been taught to begin with the inverted image, also using constantly a + lens of 3D. or 4D., so as to get into the habit of always looking with relaxed accommodation, which will give an enlarged image, almost the size of the erect. The patient stands or sits near the light, you throw the light into the pupil (previously dilated if too small), then you hold the +12D. lens 3″ before the eye, so that the light passes through the lens and pupil to the retina and choroid, from where it is reflected on the same way into your eye, giving you an inverted image of the objects in the fundus. The technic of all this is best acquired from an instructor. By this method you receive a smaller image, but you overlook a much greater part of the background than with the direct method (erect image). You move your head from one side to the other and let the patient look about so that you obtain a perfect survey of the eye, and can, in most cases, make a satisfactory diagnosis of the condition of the background.

If there are parts which you do not see large enough, you have to examine the eye with the *direct method*

(erect image). For that you turn the Rekoss disc in such a way as to have the empty hole behind the sight-hole, place the patient two feet before the light and look into his right eye with your right, into his left eye with your left, as close to his cornea as 13 mm. if possible. In this position the visual line of the patient, your own visual line, and the pencil of light passing from the lamp into your eye are sufficiently in the same direction to cause no distortion of the fundus-picture. This position, upon which Helmholtz dwells, allows you to dispense with the tilted mirror. I have often made control examinations with a tilted and with a fixed mirror, and have arrived at the same result with regard to the optical condition and the shape of the objects in the background. If, as it is customary, the patient is placed sideways of the light, then the rays passing through strong lenses behind a fixed mirror cause sufficient distorsion to vitiate the result of the examination. It is advisable for beginners, and also with narrow pupils or dull media, to have the pupil dilated, best with a drop or two of a 5 per cent. solution of euphthalmin, or with ¼ per cent. or ½ per cent. solution of homatropin.

So much, gentlemen, I would ask your indulgence for a plea to use a simple ophthalmoscope. The complicated instruments mostly do not indemnify us for the loss of time required in their use. An excellent teacher (Robert Koch) advised me in the outfit of the microscope to have only three lenses, one with 30 to 50, another with 300 magnifying power, and a third an oil immersion of 1/12; "the others are useless." With regard to the two methods of ophthalmoscopic examination, I frequently see young oculists who come to my clinic use first and only the direct method and pass an inordinate time in looking into the patient's eye without finding what I direct their attention to. When I ask them why they did not examine the patient in the indirect method, they answer that they had been taught the direct only, and had been told the indirect was super-

fluous. As this has also been expressed in some of our modern text-books, I should like to know whether this opinion is prevailing. I, from my experience, would regret if the method of examination in the inverted image were to be neglected, for I find it indispensable.