

PHOTOGRAPHY OF THE INTERIOR OF THE EYE.

BY L. RAMAKERS.

A discovery of the greatest importance has very recently been made in the domain of ocular science. Doctor Walther Thorner, assistant at the clinic of eye diseases at the Royal Charity Hospital, has solved a problem that several practitioners had a long time previously studied with indifferent results. He has succeeded in photographing the back of the eye and in obtaining good reproductions of the photographs. His invention is a great improvement upon the Helmholtz eye speculum, which permitted only of examining the back of the eye, while now an image of it can be fixed.

The failure of all attempts made up to the present to photograph the interior, and the back, of the eye has been due to the peculiar structure of this organ. It is difficult, in fact, to illuminate the eye sufficiently to obtain a photograph of it; and even upon employing powerful sources of light, the exposure of the organ would take too long and would occasion unendurable pain to the patient.

Dr. Thorner in the first place constructed an apparatus by means of which he succeeded in photographing the eyes of certain animals and principally those of cats. As the back of the eye is darker in man than in the cat, it became necessary to introduce certain improvements in the apparatus before it was possible to photograph the back of the eye of man. Owing to such improvements, the inventor has finally obtained complete success. The wide-open eye illuminated by the soft light of a kerosene lamp, is placed at the entrance of the apparatus (Fig. 1). A lens reproduces an exact image of the interior of the eye on a plate of ground glass. After an accurate focusing has been secured, the shutter is closed and set and the ground glass is replaced by a sensitized plate. A simple pressure operates the shutter, and, at the same moment, an electric spark ignites a quantity of flash-light powder. The illumination lasts for a sufficient length of time to allow the back of the eye to be reproduced upon the photographic plate. The images thus formed are still slightly imperfect, and it is necessary in developing them to exercise particular care in order that good negatives may be obtained, which shall permit of making positives such as are represented in Figs. 2 and 6. Among these images may be seen both healthy eyes and diseased ones. Here we observe the ramifications of the delicate vessels of the retina, the heavy lines representing the veins and the less conspicuous ones the arteries. It is through the observation of such details that healthy eyes are distinguished from diseased ones. Very short-sighted eyes, for example, are characterized by a peculiar aureola around the center which emits a very light radiation after the manner of a sun. (Fig. 5.) It is therefore now possible gradually to follow the progress of an eye disease through its successive periods, and likewise to photograph each of the parts of the interior of the eye separately.

Owing to Dr. Thorner's patient researches, the delicate art of the oculist is destined to enter a new phase which will doubtless be the starting point of interesting discoveries in the domain of ocular science.

At a largely attended meeting of teachers in London the other day, Mr. Mosely said that "the broad-minded way in which American engineers in South Africa tackled the propositions brought before them was what first excited his interest in the system of education in the United States." He believed that it was the fourth "R" which was at the bottom of education in this country. "Children are taught not only how to read, but how to reason." This was the spirit which permeated the whole na-



Fig. 2.—Right Eye of a Boy sixteen years of age, Showing a Normal Optic Nerve.

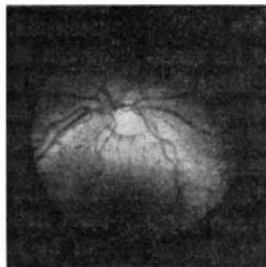


Fig. 3.—Right Eye of a Girl fifteen years of age, Showing a Normal Optic Nerve.

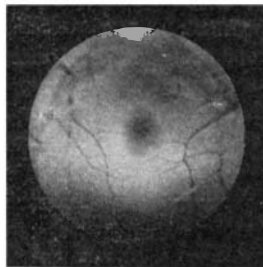


Fig. 4.—Photograph, Showing what is Commonly Called the "Yellow Spot," the Most Sensitive Place in the Eye.



Fig. 5.—The Optic Nerve of an Eye Affected with Myopia to the Highest Degree.

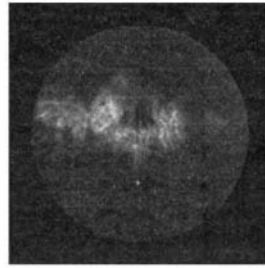


Fig. 6.—Eye Affected with Chorooiditis (Inflammation of the tunica vasculosa) in the macula lutea.

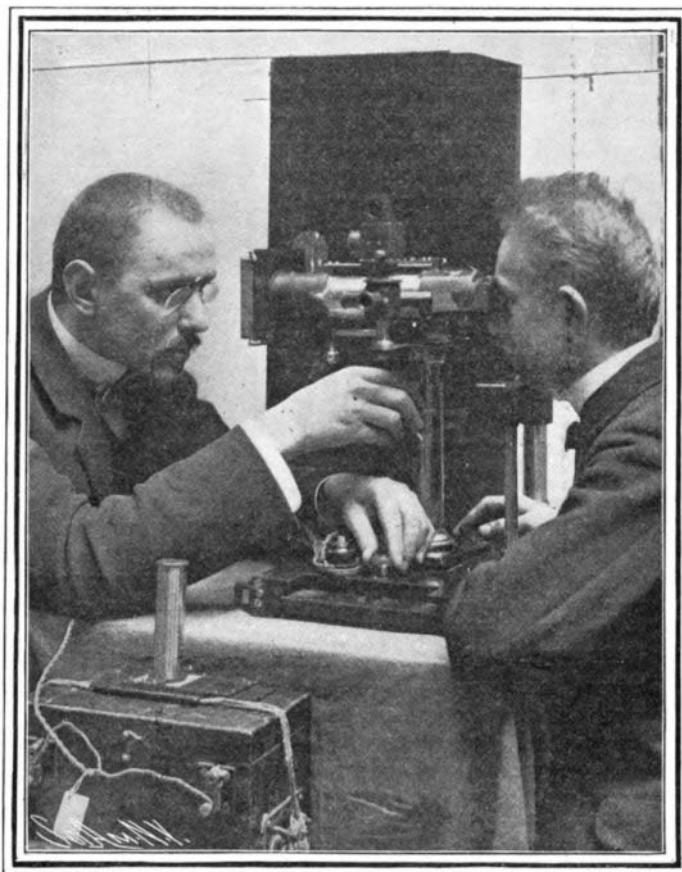


Fig. 1.—APPARATUS FOR PHOTOGRAPHING THE INTERIOR OF THE EYE.

tion and largely helped to build up its commercial success. Prof. Armstrong deprecated the tendency here to make our manual training schools into trade schools—"a magnificent metal workshop here and a magnificent wood workshop there." What would be more useful was a training for a variety of occupations with reference to local requirements.—N. Y. Evening Post.

AEROPLANES IN FRANCE AND M. ARCHDEACON'S APPARATUS. — RULES FOR CONCOURSES.

Experiments with aeroplanes are now taking a fresh start in France, mainly owing to the efforts of M. Ernest Archdeacon, an enthusiastic aeronaut and member of the Aero Club. Airships have hitherto occupied the attention almost exclusively, but at present a number of aeroplanes are being constructed, and it is expected to hold a series of concourses during the coming season. The Aero Club has appointed a commission, headed by M. Archdeacon, which will look after this

branch of the subject, and it has now drawn up a series of regulations for the different events which are to take place. Competition will be greatly stimulated by the fact that M. Henri Deutsch (who offered the \$20,000 prize for airships) has now founded a prize of \$5,000 for aeroplanes. The prize is to be awarded for the first aeroplane which will cover one kilometer (0.62 mile) including the forward and return trip. A subscription fund, of which M. Archdeacon is the first contributor, is now being raised in Paris for a similar purpose. This movement shows the interest which is now being awakened in the subject. Among the new aeroplanes

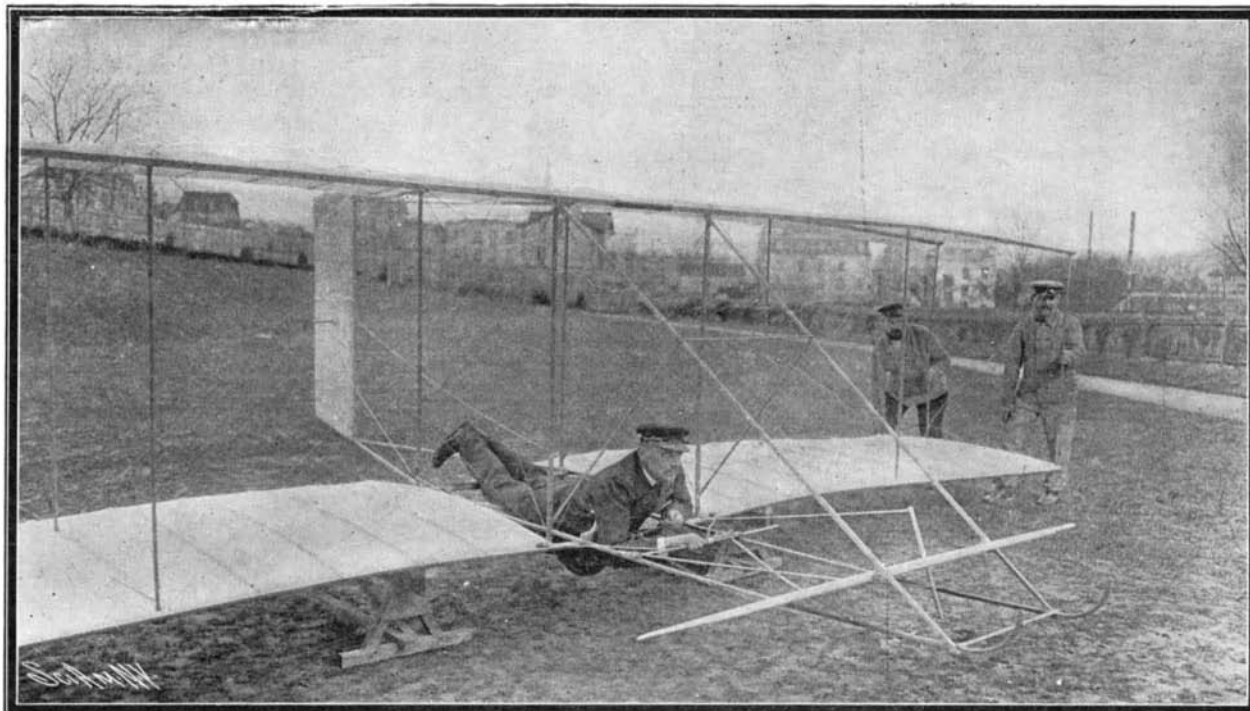
which have been built or are now in construction in France may be mentioned that of M. Archdeacon, then Capt. Ferber's apparatus, which was one of the first to be built in France, after the work of Chanute in America. The Drzewieck aeroplane is in construction at the Chalais-Meudon aeronautic establishment near Paris.

M. Archdeacon's aeroplane is shown in the engraving, mounted by the aeronaut. It was built at Chalais and then taken to the Aero-static Park at St. Cloud. It resembles the Wright (American) aeroplane in its general principles, but contains different modifications in detail which will no doubt make it an improvement over the former. It is built of an ash frame braced by steel piano wires of 0.06 inch diameter. The frame supports two superposed planes which are slightly convex from front to rear. The planes are formed of extra light French silk and measure 24 feet long and 4.5 feet wide. The planes are spaced 4.4 feet apart. The total surface is 25 square yards. The effective surface is slightly less, owing to the lower frame which supports the aeronaut in the position shown. The aeroplane has a horizontal rudder in front and a vertical one in the rear. The whole apparatus weighs about 75 pounds and is very strong in spite of its light construction. M. Dargent, the constructor, has succeeded in building it so that it can be taken apart for transportation. The aeroplane is to be taken to the new Merlimont aerodrome near Berck on the channel coast, where M. Archdeacon is to try it.

The new commission of the Aero Club recently held a meeting to fix the question of aeroplane competition and the conditions under which the trials are to be held. Commandant Renard, Messrs. Henri Deutsch, M. Tatin (who has already built the new airship "City of Paris"), Capt. Ferber, Girardot, the automobile champion, and others are among the members. The immense Galerie des Machines at the Champ-de-Mars is to be placed at the disposal of the

aeronauts, who will find ample room for making the preliminary experiments. More extended trials are to be made on different spaces of ground near Paris, and the main concourses of aeroplanes will be held at Berck, where the flat beach affords a good place. Commandant Renard proposed a set of rules for regulating the future competitive tests of aeroplanes in France, and these have been adopted. This is an important point and makes it possible to compare the aeroplanes with each other.

The rules which have been advocated by Commandant



ARCHDEACON'S FLYING MACHINE.