

NEW APPARATUS FOR PHOTOGRAPHING THE BACKGROUND OF THE EYE.

Dr. Walther Thorner, of the University Eye Clinic at the Royal Chärité in Berlin, has recently succeeded in solving a problem that has long occupied the minds of oculists, many fruitless attempts having been made heretofore to find a solution. His invention is an important one, and is a big step forward in the treatment of eye diseases. Dr. Thorner has devised an apparatus, by means of which it has become possible to photograph the background of the eye and obtain good pictures of the same. His contrivance constitutes a material improvement of the ophthalmoscope invented by Helmholtz in 1850, which latter device only admits of looking at the background of the eye. Owing to the peculiar construction of the eye, it has been impossible heretofore to photograph the interior or back of the eye. It is a matter of great difficulty to illuminate the interior sufficiently to take a serviceable picture, and even if strong sources of light were used, the exposure would last too long, rendering necessary a fixation of the eye, which in turn would entail serious inconvenience to the patient.

By means of his apparatus, Dr. Thorner first succeeded in obtaining photographs of the eyes of animals, particularly cats.

The interior of the human eye being much darker than that of the cat, it required many improvements to take good photographs of the interior of human eyes with the apparatus.

The result was highly successful, the changes proving perfectly satisfactory. We present to our readers a picture of Dr. Thorner's apparatus, constructed by the firm of Schmidt & Haensch, of Berlin.

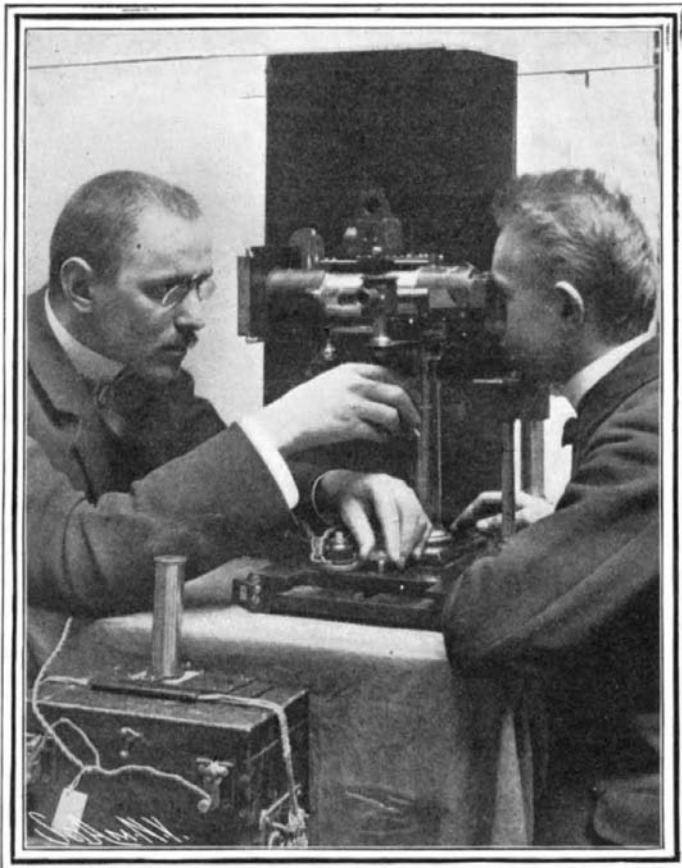
With the mild light of a kerosene lamp, the eye is first so focused that its back yields a clear image on the photographic plate, a telescope-like focusing glass forming part of the apparatus being used for this purpose. The focusing having been accurately done, and the plate put in, the camera itself is opened by pressure on a special lever, and a flashlight composition ignited by means of an electric spark generated in a storage battery. Thereby the background of the eye is lighted up sufficiently for a moment to produce a good image on the plate. Still, the pictures thus obtained are somewhat underexposed, and require special care in developing, to obtain the best results.

A large number of such photographs of diseased and healthy eyes have been reproduced by Dr. Thorner in his recent book, equally interesting to the profession as to laymen, entitled "The Theory of the Ophthalmoscope and the Photography of the Back of the Eye," published by August Hirschwald, Berlin.

It is possible to distinguish healthy eyes readily from sick ones, the eye of a strongly short-sighted person being, for instance, characterized by a peculiar ring around the sun-like illuminated center. Oculists will now be enabled to watch the progress of eye diseases or disorders step by step. The apparatus also permits of taking a picture of any separate parts of the interior of the eye.

AUTOMATIC CONTROL OF LOCOMOTIVES.

The shocking accidents which have recently occurred in the vicinity of New York city, on railroads fully equipped with block signal systems of the most improved type, and in perfect working order, have shown very forcibly that between these signals and the throttle of the locomotive, which they are supposed to control, is an unreliable human intermediary. The perfect system would, therefore, seem to be one capable of acting directly on the throttle when ignored or wrongly interpreted by the engineer. Many systems have been invented, but as we stated at the

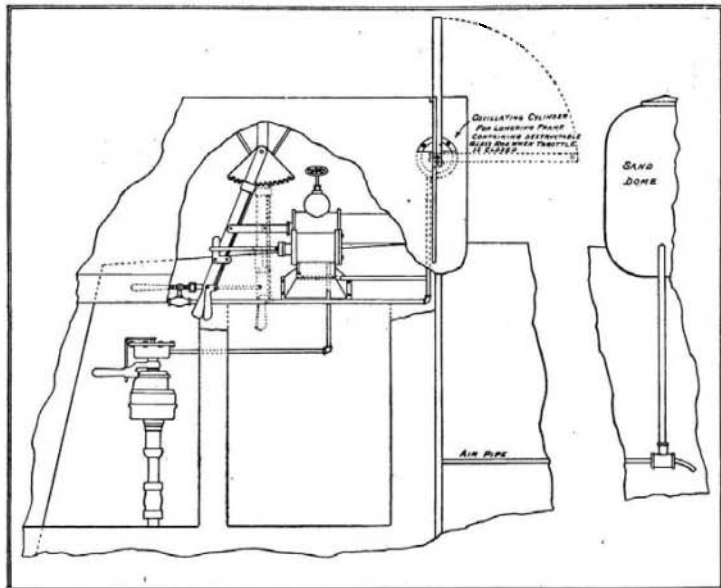


APPARATUS FOR PHOTOGRAPHING THE BACKGROUND OF THE EYE.

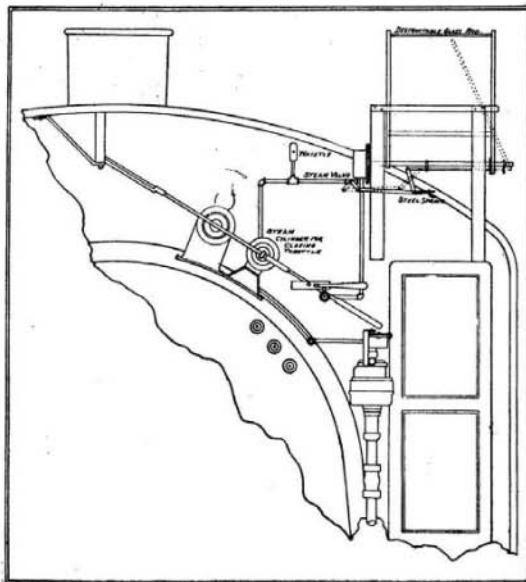
time of the Westfield horror, these are all open to the same objection, namely, that they are liable to destroy the watchfulness of the engineer, and then, should the automatic mechanism become disarranged, the chances of accident would be greater than ever. But this objection does not apply to the automatic signal system which we illustrate herewith, for it is so arranged as to increase, rather than diminish, the

vigilance of the engineer. Every time a signal, is ignored, the locomotive is automatically stopped, but at the same time a record of the fact is automatically made which the engineer must explain at the end of his run.

The mechanism employed in this system is very simple, and is clearly indicated in our detail views. Projecting above the cab of the locomotive are two parallel and vertical arms, the outer one of which is pivoted to swing sidewise toward the other arm, but is normally held parallel therewith by a glass rod interposed between the arms at their upper ends. The signal system along the track consists of the usual block signal semaphores, but in addition to these each signal post is equipped with a lever normally in a vertical position, connected to these semaphores. When the danger signal is set, this lever is swung to horizontal position over the track, so as to strike and shatter the glass rod carried by the locomotive. When the glass is broken, the pivoted arm swings to the dotted position shown in our front view of the apparatus. In so doing, by means of the lever connections shown, a steam valve is thrown which admits steam to the throttle-closing cylinder. As shown better in our side view, the piston rod of this cylinder is so connected to the throttle-lever as to first unlock it and then draw it to closed position. At the same time a valve is turned which throws the sand lever. When the throttle is closed, the piston in the throttle-closing cylinder uncovers a port leading to a valve which acts on the engineer's brake lever and sets the emergency brakes. Thus, the train is automatically brought to a standstill without the assistance of the engineer, and cannot be started again until a new glass rod has been placed between the pair of vertical arms. This, however, occurs only in an emergency, as the engineer is provided with a means for swinging the glass rod out of the path of the danger signal, and is held responsible for any failure to do so; but



Side View, Showing the Details of the Controlling Apparatus.



Front View of the Controlling Apparatus.



BLOCK SIGNAL DIRECTLY CONTROLLING THE THROTTLE OF A LOCOMOTIVE.

by means of an interlocking system, the throttle must first be closed before this can be done. The two arms which hold the glass rod are mounted in a swinging frame, so that they can be swung forward and downward, thus clearing the danger signal. The swinging frame is operated by an oscillating steam cylinder controlled by a valve lever near the throttle lever, but is locked by a rod extending from this lever. When the throttle is closed, this locking rod is withdrawn from engagement with the valve mechanism, permitting the latter to be turned to admit steam to the oscillating cylinder, which will then swing the frame to the dotted position shown in our side view. Owing to the interlocking connection of the valve with the throttle, the latter cannot be opened until the valve has been closed, shutting off the supply of steam and permitting the frame to swing upward to its normal vertical position. This precautionary device prevents the careless engineer from running his engine with the automatic mechanism in the inoperative position. Owing to the fact that engineers sometimes suddenly die or lose consciousness at their posts, a whistle has been attached to the steam pipe which leads to the throttle-closing cylinder, so that whenever the automatic operations take place, this whistle will sound a call to the fireman, who can come to the engineer's aid in case of necessity.

As a check upon the engineer for failure to close the throttle at each danger signal a time-recorder is placed in the cab, and this records each automatic closing of the throttle. Furthermore, each engineer is provided with a limited number of glass rods and must account for them all at the end of his run, giving satisfactory explanation for