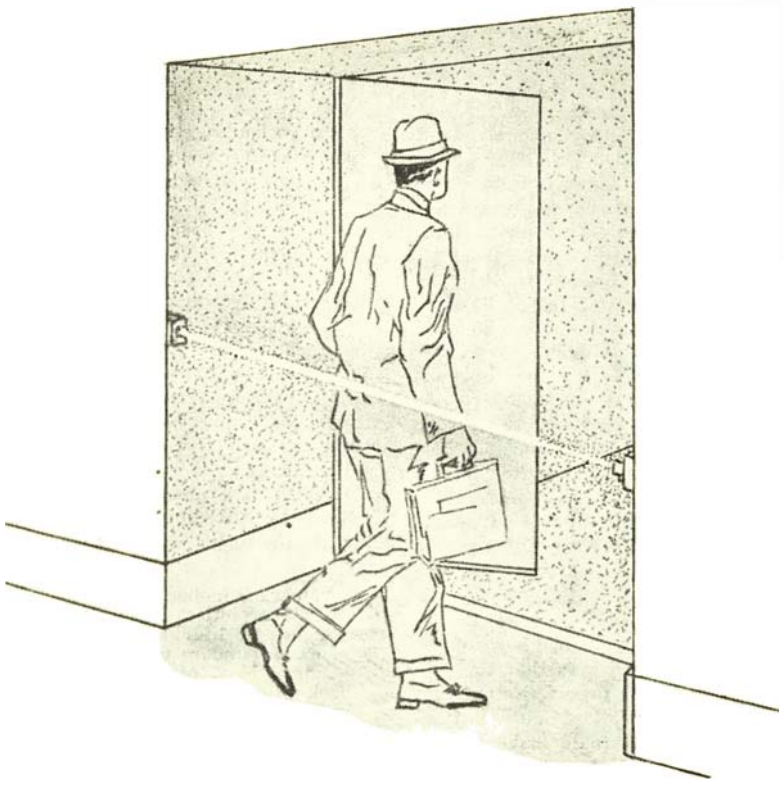


THE POPULAR NAME is "electric eye" but some call it "magic eye", and the first experience was startling as magic. As a young girl attending college in Manila many years ago, I stepped on the threshold of Aguinaldo's on a shopping day and immediately the door opened before me. Noticing that nobody appeared from within, my mind began to question the promptness and smoothness of the door's response to my presence. I walked in and it closed. I walked back to the door and it opened again. "The magic eye", I thought, recalling what I had heard before. "So this is it."

The later years brought some understanding of the secret wonder behind the eye that sees unseen. A beam of invisible light activates the electric eye by causing electrons to flow through a circuit connected with the door's mechanism. Crossing the path of the beam would, at that instant, cut it off and simultaneously, stop the flow of current. The effect is like a switch which triggers the opening and closing of the door.

OF PHOTONS & PHOTOTUBES

German Grants Help Physics Research in San Carlos

by Brigida Koppin

Author is editor-in-chief of the Junior Philippine Scientist, *a university publication; a teacher, physics researcher, and secretary with the Physics department. Miss Koppin holds two bachelor's degrees, in physics and pharmacy, and an M.S. in Physics from USC.*

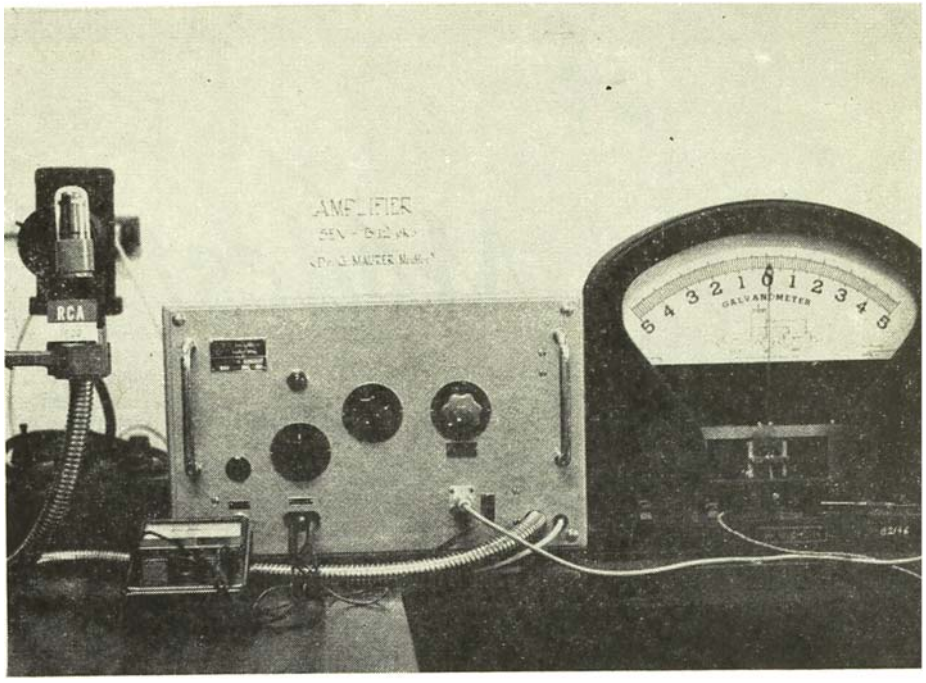
The student of science will recognize the "eye" by the name *phototube*. It is a light-sensitive device which far surpasses the human eye's capability to detect and observe. Exceeding the human eye's sensitivity to all the colors of the spectrum, photosensitive devices have ranges that extend beyond the visible region into the ultraviolet and infra-red. They are said to be capable of tracking an object in flight, whether it be a bullet or a cosmic ray particle. They can accompany a rocket to outer space or explore a hole drilled deep into the crust of the earth.[1]

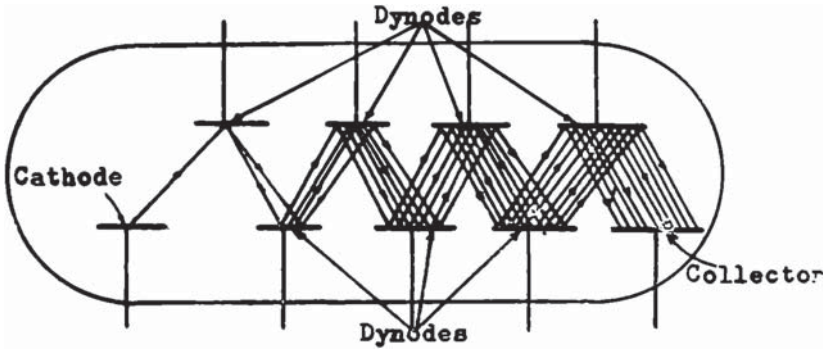
We speak of light waves and light beams, and imagine one continuous undulating line of light when we think of a ray. But light is not continuous; its texture, if it could be felt, would be granular because light consists of discrete packets of energy called photons. The eye is unable to distinguish these particles of light, as such because photons are so tiny and multitudinous that they flood the vision like a fluid. But a phototube can; it is tuned to detect a photon if it encounters one. Such is the sensitivity of this device.

Footnote: 1) **Phototubes and Photocells** (Radio Corporation of America) p. 3.

And how does this work? A single photon hitting the sensitive cathode of the tube knocks off an electron which is then attracted to the positive anode. But one swallow does not make a summer, and so one electron cannot make a measurable electric current. To enhance the effect of one photon, the multiplier phototube was developed. Between its cathode and electron-attracting anode are several target electrodes at increasing potential known as dynodes. Suppose a single photon ejects one electron from the cathode, the electron will be drawn towards the nearest dynode and, upon hitting the surface, it will kick out another electron. Together they are attracted to the higher potential of the next dynode where each will release an additional electron. The four electrons are now drawn to the higher potential of dynode no. 3 and their number is doubled. If you will try to figure out the number of electrons that will result from one photon after successive multiplication in nine dynodes, you will realize that the effect of a photon is magnified 256 times before it reaches the anode. A photo-multiplier with nine dynodes is among the latest addition to the research equipment in the Physics Department of this University. Rev. Dr. Michael Richartz, SVD whose studies in optics have met recognition in such internationally known scientific publications as *Optik*, and *Zeitschrift für Instrumentenkunde* (both of Germany), and the *Journal of the Optical Society of America*, will use the equipment to test the reliability of the photoelectric methods he proposed for measuring optical activity and ellipsometry. Along with the multiplier phototube are an amplifier and two pieces of graduated circles for measuring the rotation of polarized light to within one minute (1/60 degree) of accuracy. The change in intensity of light resulting from its rotation by means of a polarizing prism can be detected only with a phototube. Fr. Richartz has spent more than 30 years of his life in the study of optics. His articles are cited as references in a few physics encyclopedias and some books in optics by well known physicists as Max Born and Emil Wolf.

This equipment is a personal grant to Father Richartz from the Fritz Thyssen Foundation upon the recommendation of the Federal Government Agency for German Scientists in Foreign Lands (Vermittlungstelle für Deutsche Wissenschaftler im Ausland). Two years ago, Fr. Franz Oster, SVD, also of this Department and temporarily assigned in Formosa, received through the same agency a vacuum pump for his high vacuum laboratory. His work concerned the study of sputtering patterns created by discharging ions in a vacuum under the joint influence of a magnetic and an electric field. It is still going on. The latest recipient is Fr. Hubert Lorbach, SVD Head of the Physics Department, who will receive additional equipment for the radiation laboratory. In a letter recently received, he was informed that a complete radiation counter with pulse-height analyzer will leave the factory for USC in August of this year. ‡





MULTIPLIER PHOTOTUBE is shown in top photo, donated by the Fritz Thyssen Foundation of Germany. Rev. Dr. Michael Richartz, SVD (right) head of the USC Mathematics department, holds a Ph.D. in mathematics and physics from the University of Munster, Germany. Thirty years engaged in optics research, his papers have appeared in international scientific journals, the latest carried by the publication of the Optical Society of America.