

**The Knowledge Bank at The Ohio State University**  
**Ohio State Engineer**

**Title:** Engineering Abstracts

**Issue Date:** Feb-1930

**Publisher:** Ohio State University, College of Engineering

**Citation:** Ohio State Engineer, vol. 13, no. 4 (February, 1930), 18-19.

**URI:** <http://hdl.handle.net/1811/34678>

**Appears in Collections:** [Ohio State Engineer: Volume 13, no. 4 \(February, 1930\)](#)

# ENGINEERING ABSTRACTS

## NEW USES FOR PHOTO-ELECTRIC CELL

Who would think that the heart of the television, the photo-electric cell, could be utilized to extinguish fires, count people, or pass objects of any size, automatically sort materials according to their imperfections, or to provide safety against explosions in gas and oil furnaces? Yet it can, and has done these things and could do many more of the same nature, that is, of any such character as to provide the slightest variation of light intensity.

The photo-electric cell is that part of the apparatus which changes the energy of the light waves to electrical energy. First, there is a glass tube, usually almost spherical in shape, that is coated on the inside with silver, which is not photo-electrically sensitive. A small unsilvered aperture is left in the side of the tube to admit the light. A platinum (or other suitable metal) cathode is placed in the center of the tube, perpendicular to the path of light which will come through the small uncoated surface of the cell wall. This cathode is coated with condensed potassium vapor. The light admitted through the "window" strikes the alkaline cathode, its energy causing the cathode to emit electrons which flow to the positively charged anode, the mirrored surface of the tube. This surface serves two purposes; it excludes the light from the interior of the cell, i. e., reflects it, and its conductive property allows it to carry away the charge imparted to it by the negatively charged electrons. The varying light intensities cause a proportional increase or decrease in the number of electrons emitted, this in turn causing a proportional increase or decrease in the current thus established. In actual practice, however, the wire carrying the charge from the anode is connected to the grid of an amplifying circuit; the cathode being connected to the filament—which of course increases the current produced by the light energy and makes it available for practical use.

Where arduous tasks of sorting have heretofore been dependent upon the easily wearied human eye, a mechanical process may now be substituted, thus releasing many workers for less monotonous tasks. More accurate than the human eye, the photo-electric cell responds equally well, day or night, in hot or cold weather.

An example of this; a spot of light is made to fall on the surface under examination and reflected from the surface to the photo-electric apparatus. Small packages of supposedly uniform character are automatically moved past this spot of light. If one of them is without a label, or otherwise defective, it is automatically thrown out.

A similar device would be applicable to the automatic inspection of wide surfaces such as metal sheets that should be of uniform character, or in selecting paper for defects, analyzing colors to match fabrics, paints, tiles, etc. All this is now done by the eye but the electrical eye presents a more scientific and precise method. It is expected that it will be much used in the future.

## NEW USE FOR "ELECTRIC EYE"

The photo-electric tube or "the electric eye" has now become an official greeter, a watchman or a policeman.

Visitors at the Museum of Peaceful Arts, New York, are greeted by the words, "Will you please register," as they step from the elevator into the great room housing an interesting and valuable exhibit. No one is in sight, no one need be. The speaker is in a little box; the speech, recorded on a disc never varies. The record starts when anyone passes through a beam of light.

By changing the record at night, a prowler may be startled by the command to "Throw up your hands, I've got you covered," by a warning in the vernacular, "Beat it bo, the cops," or a dignified statement such as, "This place is dedicated to peaceful pursuits, depart and sin no more."

The official greeter of the Museum is a thyatron control device, developed in the Research Laboratory of the General Electric Company, and consists of a light source, a photo-electric tube, and a thyatron. When a person leaving the elevator passes through the light, which is directed on the photo-electric tube, the small current passing from the photo-electric tube is interrupted, and the voltage on the grid circuit of the thyatron is changed and the plate current is cut off. This operates a relay which in turn starts a small synchronous motor. Attached to the shaft of the motor is a contactor wheel with a series of spaced contacts. These contacts are also in the plate circuit of the thyatron and the contactor wheel opens the plate circuit until the speech has been completed.

## SMOKE DETECTOR EXHIBITED

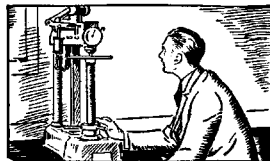
One of the features of the International Heating and Ventilating Exposition which opened recently in Philadelphia is a smoke detector that may be used for fire prevention.

The smoke detector on display is a laboratory model, and illustrates the application of the photo-electric tube which is now being made experimentally in the Hudson tube, connecting New York and New Jersey. In the tube, the smoke detector or visibility meter as it is there called, is placed in the exhaust duct. If the exhausting smoke becomes dense the photoelectric tube gives warning and attendants put additional exhaust fans to work.

The device shown in Philadelphia consists of a long glass tube. In one end is a light source and in the other a photoelectric or light sensitive tube. A small opening in the glass tube permits the operator to blow smoke inside the chamber. When the light intensity is dulled by smoke, the photo-electric tube responds, throwing a relay which starts an exhaust fan. The fans continue in operation until the atmosphere within the chamber is cleared. The same device may be utilized for fire detection, in which case the relay operates a buzzer or bell instead of the fan.



TESTING THE MATERIAL



MAKING THE CABLE



CONSTRUCTING THE LINE



## Winning the war against weather

In the telephone business, research man, manufacturing engineer and construction supervisor are carrying on a successful war against the unruly elements, enemies to service.

Cable, for example, housing many circuits and covered with protective coatings

of proved strength, withstands storms which might seriously threaten open wire lines.

Thus in the Bell System growth is intensive as well as extensive, improving present facilities as well as adding new ones. And there is no end to all this development.

### BELL SYSTEM

*A nation-wide system of inter-connecting telephones*



“OUR PIONEERING WORK HAS JUST BEGUN”

FEBRUARY, 1930