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THE PHOTO-ELECTRIC CELL

By FRANK RHODES

NO, the photoelectric cell has not replaced the famous G-Men or even the secret service, but it is rapidly replacing the human eye in a number of industries and in a variety of ways. The term *photoelectric cell*, which is synonymous to the photocell and the phototube, is probably quite familiar to you. It is not uncommon to hear of a bridge being opened or a fair, as was the Chicago World's Fair, being started by the light from a distant star striking

a photo-electric cell. Most everyone has drunk from a fountain where the water is turned on automatically as one stoops over for a drink.

Surprisingly enough the photoelectric cell was discovered in 1887—fifty years ago—by a German physicist named Hertz. Technically it is the effect produced by the emission of slowly moving negative electrons from the surface of an alkali metal when it is struck by light rays. In its infancy only the fre-

quency of ultra-violet could be used in the photoelectric cell. Now, however, visible light rays may be used.

The most important application of the photoelectric cell is in an industry which, although developed only in the last decade, is thoroughly familiar to everyone: the art of producing sound motion pictures. You probably will remember the first talking pictures and the excitement caused when a theatre advertised, "This is a 100% all-talking picture." These first talkies used a phonograph as their source of sound. This procedure necessitated manual synchronization. This system was very unsatisfactory because as soon as the novelty of talking pictures wore off, the public grew tired of seeing on the screen a gun fired and then waiting several seconds before hearing the report of the gun. It was then that the photo-electric cell was utilized and a system devised whereby it could be used in the movies.

With the use of the photoelectric cell it is impossible for the sound to become unsynchronized with the picture. A non-technical description of the principle of present audible movie can be made quite simple. Along the side of the film is a sound track which looks like a mountain range seen from a distance and tipped up on its side. This so-called track passes in front of a slit behind which is a photoelectric cell. This slit is only .0025 inches wide (just one-twelfth as thick as a human hair).

The tone produced over the loud speaker system is dependent upon the amount of light passing through the slit and reaching the photoelectric cell. The current which produces the different tones varies directly as the intensity of the light. These tones of various pitches give us the sounds we hear at a movie theatre. This same principle of the photoelectric cell is used in a large variety of ways.

It is interesting to know how many uses, important to every civilized person, the photoelectric cell has. For instance, it is used in industry for performing many tasks. It counts the number of articles turned out in mass production; it is used for inspecting purposes. When it is imperative that each article turned out be exactly the same size, the photoelectric cell has proven both more accurate and more reliable than a human being. It is also used to match the colors of various articles. Due to the fact that every different color has a different frequency, it is possible by using the photocell to differentiate between colors which, to the naked eye, would look identical. The photocell can also be used to stop machinery when a certain temperature, above which the machine would be ruined, is reached.

The instrument is employed in counting the persons going in or coming out a doorway; vehicles entering or leaving a tunnel, or traveling a certain section of road. The photoelectric cell is used extensively in

television. Television is in the same stage of development now that radio was twenty years ago and is certain to be of vast use in the near future. Mr. L. W. Wilson, director of research in Pittsburgh, says, "Television of a quality good enough to deserve the name is absolutely impossible without the photocell."

Almost every picture seen on the front page of your newspaper that deals with out-of-town news was put there with the aid of the photocell. The transmission of pictures over telephone wires is a very interesting procedure. The picture to be transmitted is taken, in the form of a transparent film, and bent into the shape of a cylinder. This cylinder is mounted on a carriage so that it rotates at the same time it moves transversely. A small spot of light thrown on the film, then, covers its entire area in a long spiral. The light which passes through the film varies in intensity with the tone value of the picture, therefore the current produced also varies. The receiving end, through these variations in current, is able to reproduce an accurate copy of the original picture on a similar cylinder. The receiving cylinder must, of course, travel at the same uniform rate as the sending cylinder.

As a final illustration of the many roles played by the photoelectric cell in the service of humanity, consider a reading device in which a photoelectric cell actually takes the place of the human eye. This particular instrument can be used on a book, magazine, or even a newspaper. Of course, an adjustment is required for each different size of type. Every letter in each word produces a different tone in a blind person's ear. It is comparatively simple to learn to recognize words from a group of different tones. After practicing for several months, a blind person can read as many as sixty words a minute. The only way in which it would be possible to realize the entire importance of the photoelectric cell would be to try to do without it.

Izzy: "Vere's my spectacles?"

Abie: "On der nose."

Izzy: "Don't be so indefinite."

DEVILISH DEVIL

The devil raised the naughty wind

To blow the skirts on high

But God was just and raised the dust

To fill the bad man's eye.

Truth is stranger than fiction—because you don't hear it so often.

Mr.: "Well, what did you name your baby girl?"

Mrs.: "Hazel."

Mr.: "With all the great names in the Bible you had to name her after a nut."