

## EYES THAT NEVER TIRE

In a factory just outside Pittsburg stands a giant press which towers 35 feet in the air. It has massive jaws between which heavy steel plates crinkle as if they were made of tissue paper.

Vicious as this mechanical monster looked to me as I watched it at work, the men who operated it did so in perfect safety, for at various parts of the press narrow beams of light traced out the danger line. The instant a man's hand might cross this beam of light, the press would stop dead in its tracks, thanks to the magic of untiring "electric eyes" or phototubes. It was almost impossible for an operator to get hurt around this machine.

This practical application of the phototube or "electric eye" is an example of one of the many thousands of amazing services rendered by this mechanical servant of man. In our industrial plants alone, tiny, gadget-like elec-

trical eyes are credited with preventing numerous accidents each year.

No doubt most persons have encountered some of the modern phototube at one time or another. For example, the entrances to many modern office buildings are equipped with electric-eye operated doors which open with uncanny precision as one approaches them. Phototubes are the magic "elevator men" behind the scenes in self-operated elevators frequently used in hospitals. Without them the express elevators in skyscrapers would never hit the floor level "on the button" each time. Without them the colors in the rotogravure supplements of the Sunday newspapers would not come out even. And if you have ever bent over a water fountain for a drink and the water jumped up at you like a miniature geyser without warning, it was because in

the act of bending you started an electric eye into action.

Perhaps the most remarkable thing about the "electric eye" is its versatility. It is being used to sort out all kinds of items — defective beans, oranges, apples, buttons, cigars, or what have you, at a phenomenal rate. If you have noticed that you no longer land on solid "rock" occasionally while munching on a peanut bar, it is because the peanuts used in making candy bars are now scanned by phototubes to catch any stray bits of stone or other impurity which may get by a visual inspection of the peanuts.

One manufacturer of small gears, bolts, and nuts by means of the new molding processes of power metallurgy uses the phototubes to count out more than 50,000 molded parts per minute. Producers of small unit items like cigarettes, matches or jelly beans can count their day's production accurately and automatically with the aid of electronic counters.

Working as they do with the speed of light, phototubes can match fabrics or

false teeth according to shade, fill gingerale or milk bottles to an exact level, count the number of persons going in and out of the New York Public Library, or any other public building, or take a tally of the traffic through the Holland tunnel or over the Golden Gate Bridge. Fruit growers have found that electric eyes are tireless inspectors. They have used them to sort fruit into nearly uniform sizes, as well to sift out the occasional "bad" apple, lemon, orange or grapefruit.

Scientists use phototubes day in and day out to determine the vitamin contents of certain foods in a jiffy. Using an instrument called a photoelectric colorimeter, a research chemist is able to determine how much iron is present in spinach or how much sulfur in an egg yolk in a matter of a few minutes. An instrument, known by the alarming name spectrophotometer, uses electric eyes which are capable of picking out and grading two million different shades of color! The very best the sharpest-eyed human being can do is

to detect about ten thousand different shades.

Electric eyes are the most sensitive instruments known to man. Recently, I saw them at work in a steel mill rolling 15-ton ingots of red hot steel back and forth between huge rollers as casually as I used to roll my own cigarettes.

In another sheet metal plant I saw phototubes acting as master eye-detectives, finding minute holes in a continuous tin sheet rolling machine. Not only would they pick out the holes in the thin metal sheeting, the kind your favorite canned foods come in, but they would also operate mechanisms to mark the spot of the defect! Thousands of dollars are saved in this way each year by eliminating food spoilage in what would otherwise be defective tin cans.

In textile mills fabrics are shuttled out with the indispensable assistance of phototubes. If a thread breaks, the weaving or knitting machine is stopped in a flash.

Television and the transmission of pictures by wire are made possible by means

of electric eye devices. The pictures carried to a television screen come in millions of pieces, pieces which are put together by electric eyes in a systematic manner.

Probably one of the most interesting future uses for phototubes which I have run across is the recent prediction by Dr. Irving Langmuir, the famous General Electric, Nobel Prize winner. According to Dr. Langmuir, it is possible that some day a machine will be constructed which will be a super-Goldberg contraption. Using a battery of phototubes, this instrument will be able to scan a fruit tree and direct mechanical pickers to apples, oranges, or pears, which are of the desired degree of ripeness. The mechanical pickers could pick fruit of a predetermined size and color, and drop it gently into waiting containers!

In Philadelphia bakery electric eyes control the high speed saws which slice the bread, and also the automatic wax paper wrapping machines. In Boston similar devices insure uniform stropping of safety razor blades. One of the most effective

anti-burglary set-ups ever invented is on the job in many New York banks. Here electric eyes are so set up as to help a hidden camera take a snapshot of a burglar as he prowls about a safe. At some of our smaller airports, electric eyes will turn on floodlights automatically should a plane be forced to make an emergency landing in the dark of night.

One of the most practical applications of phototubes was demonstrated to me recently at a Chicago electronics exhibit. There I saw a new electronic "seeing-eye" being offered as an amazing substitute for the seeing-eye dog. This new instrument proffers to do for the blind what electronic hearing aids do for the deaf.

Although the electric eye got its start as a gadget more than 50 years ago, it has since proven its worth, and its future today is more promising than ever before. Here, indeed, is an invention which men have put to good use. This mysterious electronic tool alleviates routine burdens and substitutes safety where once only danger and death lurked. That there is no end in sight for its usefulness as an untiring servant of man is demonstrated by the opinion of one electronics engineer who told me, "It has been estimated that electric eyes have at least 100,000 uses. Fifty years from now I predict they will have 200,000 uses." — *By O. A. Battista, from American Mercury.*

## LEADERSHIP

Leadership in a democratic society does not mean the exercise of control and direction of a group of followers or of a section of the country. It is recognition of consensus and stimulating that consensus into a final and concrete objective.