

Using the "Electric Eye" to Destroy Insect Pests

ELECTRIC eyes now aid man in his war upon insects. This device, which is a photo-electric cell, is installed in orchards to turn on electrically lighted insect traps at dusk and turn them off at dawn.

The electric eye is entirely automatic in its operation. When the light intensity in the orchard falls below 45 foot-candles, the photo-electric cell closes a switch which turns on all the light traps. When the light intensity rises above 90 foot-candles it opens the switch, turning off the lights.

A time-clock device would be satisfactory if dusk arrived on a time schedule, but light clouds cause dusk to arrive a little earlier and heavy clouds much earlier.

The electric eye is claimed to be the only known device which will automatically recognize the approach of dusk and turn on the lighted insect traps.

The photo-electric cell also eliminates the human factor. It is exceedingly difficult for an attendant accurately to judge the fast-changing shades of afternoon light as it fades into darkness. Yet it is of particular importance that the lighted traps be turned on at the right time, because investigations have shown that moths begin to fly and to lay eggs about 20 minutes before sunset.

Twelve acres of an apple orchard were illuminated as if for a garden party in this experiment, which is one of the outstanding scientific projects of its kind.

Moths are the marauding invaders that play havoc with fruit. The method employed against the moths is to attract them by means of electrically lighted traps located in the foliage of the trees. In one kind of trap they are caught in water pans under light. In another they are electrocuted as they come in contact with high voltage wires which surround the source of light. Every time a buzz is heard, another moth has sizzled to destruction.

The experiments in destroying insect pests have been in progress since 1929, under the direction of Dr. P. J. Parrott, assistant director of the New York State Experimental Station at Geneva, New York. Already sufficient progress has been made to justify continuing the investigations which may lead to a more general use of light for trapping insects.

Experiments over a four-year period

Insect Pests

How Bugs That Devour Crops Are Now Lured to Death by Electrocutation.

In a certain plot indicate that this reduction in injury may be of a cumulative type, that is, that year by year the coddling moth infestation is diminished from the degree of the previous year.

E. H. Vedder, a Westinghouse engineer, points out that the entry of the "electric eye" into the field of insect extermination is but another use added to the rapidly growing total that are common to every day life. Offices and factories use it in counting and sorting operations. Industries and stores use it to match objects and materials for color.

In ultra-modern drinking fountains, the "electric eye" turns on the water as a person stoops to drink. In buildings and warehouses, it prevents elevator doors from closing on passengers and warns of fires. In smart restaurants, it causes doors to open in front of burdened waiters. For the up-to-the-minute suburbanite, it opens the garage door as he puts the car away for the night.

There is no escape from the "electric eye" for the walls of prisons are now guarded by this wide-awake device. With photo-electric cells properly installed for this purpose it is impossible for a prisoner to attempt to scale a wall without setting off an alarm.

To demonstrate just how the electric eye foils all attempts at escape a prison wall in miniature, 16 feet long and nine



feet high was erected. Along this wall an electric eye watched a beam of light. An assistant dressed in prison garb stealthily approached the wall. He attempted to climb over. Immediately, as the beam of light was interrupted the electric eye came into action. It fired a gun thereby warning all within hearing that an escape was imminent. That, however, was not all.

An iron door was set into the wall. Another tube, this one called a "grid glow," was guarding the door. The moment a human hand approached this door, even if it did not quite touch it, a prison siren started to scream. The wall and door were automatically and abso-

lutely guarded, night and day, by these electrical products.

This demonstration was especially rendered to show the ability of these two tubes to guard walls and doors against intruders and is another triumph of the electrical laboratory. Thus the electric eye is shown to be even more efficient for certain purposes than the human eye.

The electric eye resembles in its external appearance a radio vacuum tube. Originating in research laboratories long ago, the photo-electric tube was greatly improved in the impetus given to tube development by radio following the World War. In making possible to-



Left: The Electric Eye Which Controls the Light in a Trap for Exterminating by Electrocutation Moths and Destructive Bugs That Attack Crops.

Above: Inspecting the Light Trap Which Electrocutates Moths and Other Insects. The Light Within Lures the Unsuspecting Bugs, Which Die Instantly on Coming in Contact With the High-Voltage Wires Around the Light. The Dead Insects Are Collected in the Pan.

day's talking movies, it achieved its first commercial importance.

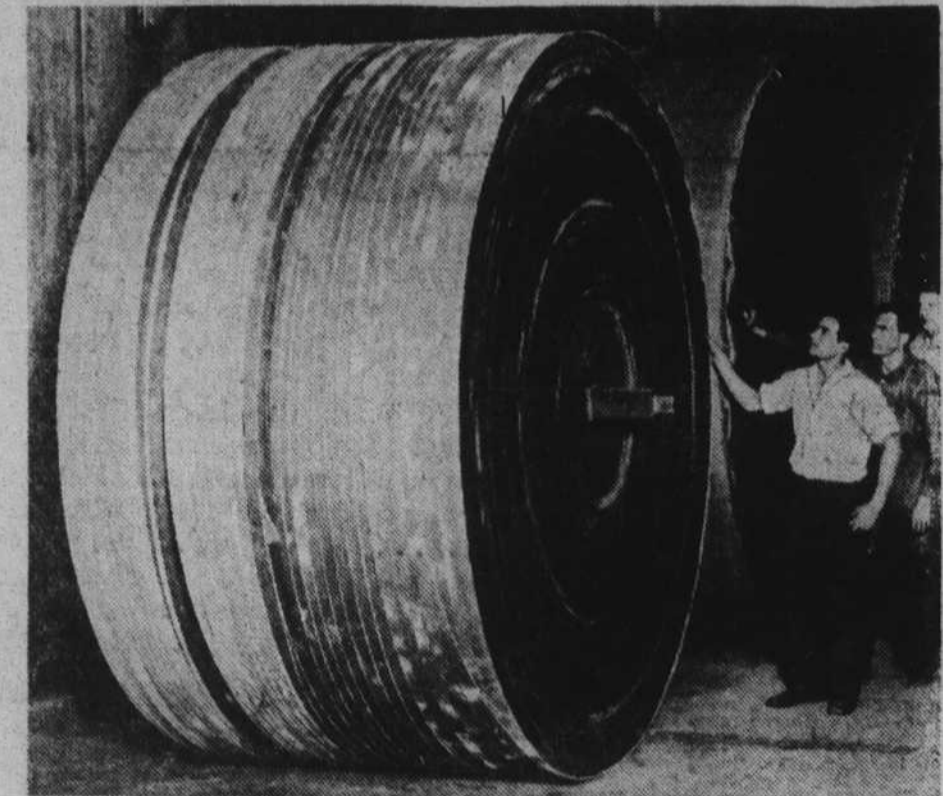
An important use of the electric eye is its application to the stopping of elevators, which is a very simple operation. A small automobile headlight bulb is mounted upon a control panel on the side of the car. An "up" controlling photo-tube is mounted three inches from, and on a horizontal line with, the light bulb. Three inches on the opposite side, the "down" photo-tube is

mounted. When the light's rays fall upon the "up" tube the car moves upward and when they illuminate the "down" tube, the car descends.

The photo-electric cell's usefulness is due to its peculiar reaction to light. When the sensitive, coated-metal cathode inside the tube is illuminated by an outside source, the tube allows an electric current to pass through its circuit. If the outside source ceases to emit light or if its rays are interrupted before striking the tube, no current can pass.

The time-and-bother-saving applications of the electric eye already made are not a drop in the bucket compared to the number that will be eventually in use, engineers predict. The world is approaching an age wherein many of man's actions will be anticipated and assisted by an electrical or mechanical servant. The electric eye is bringing that time nearer day by day.

The Biggest Belt in the World



This Huge Belt Which Weighs 31½ Tons Is One and Three-fourths Inches Thick. It Is Used on a Conveyor Capable of Handling About 2,000 Tons an Hour and Was Made in Three Sections, Each of Which Weighs 21,000 Pounds.

WHEN a limestone company found it necessary to increase the handling of their product to 1,950 tons an hour they required for that purpose what is claimed to be the biggest belt in the world.

This belt, which is shown in accompanying illustration, was made in three

sections, each weighing 21,000 pounds. This makes the total weight of the entire belt amount to 31½ tons.

The belt is 54 inches wide and one and three-fourths inches thick. It was designed for use on a conveyor 700 feet long and is capable of handling about 2,000 tons an hour.

How Sun-Spots May Be Formed

A SIMPLE experiment made with a special device constructed by a European physicist named Riabouchinsky, may offer a solution of the secret of how sun-spots are formed.

The sun, astronomers have found, is not a solid sphere. It does not consist of liquids even, but gases. Observations

show that the period of the sun's rotation at the surface is not uniform.

Magnetic researches detailed by Dr. Ross Gunn, of the United States Naval Observatory, conclude that the sun, as a body rotates in 31.8 days; while at its surface the rotation takes place in between 24.5 and 26.7 days.

Riabouchinsky constructed an apparatus in which a propeller is revolved in a glass vessel full of water. When the vessel stands still, a vortex is formed (Fig. 1); but when the vessel itself is also turned at a different rate, eddies reach the surface of the glass and form spots on them.

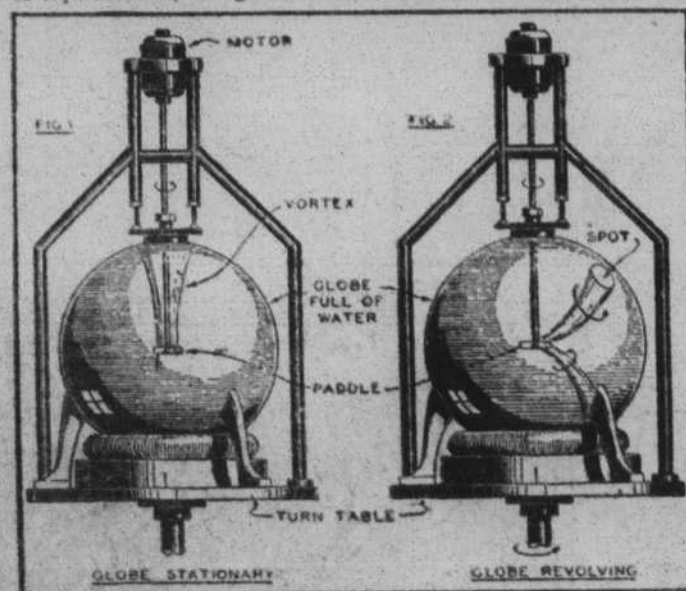


Figure 1. The Water-filled Globe Is Stationary, as the Little Paddle Revolves, Making an Eddy. Figure 2. When Both Globe and Paddle Are Revolving, "Spots" Are Formed.

A New Fog-Piercing Headlight for Motor Cars

FOG, terror of night-driving, which looms as an eerie, misty wall in front of the motor car headlights, has yielded to a new amber parallel headlight, perfected after four years of research. The new headlight throws out and down two narrow rays, each about two feet in width. These beams, from 75 to 125 feet in length, depending upon the density of the fog, illuminate the roadside ahead of the car. Automobiles have been driven at speeds as high as 35 miles an hour, using the new lights, through fogs which otherwise would have slowed the driver down to five miles an hour.

Fog consists of minute water particles held in suspension. The action of these particles upon the white rays of the ordinary headlight, is what causes that impenetrable wall to form in front of the eyes of motor car drivers. Some of these water particles are round, some tear-shaped. They do all sorts of things to light rays. They reflect and refract them, from particle to particle and break them up into millions of minute rays which are sent in every direction. Some of the particles act as prisms which split the white rays into the elemental colors thus producing a rainbow effect. Part of the rays reflect back into the eyes of the drivers so, with all this going on, it is no wonder that they see in front of them only a dim, misty, eerie wall of light. Then come accidents, all due to the wall of diffused light that hides the road from drivers' eyes.

The new fog-piercing beams, however, operate on a different principle. Two headlights are used each consisting of the usual six-volt lamps and parabolic reflector. They are located, however, about the center of the radiator, faced away from each other at an angle of approximately 30 degrees,



The Fog-Piercing Headlight Which Throws Two Amber Beams Directly Down the Side of the Road. The Drawing in the Circle Shows How Two Lights Are Combined Into One Headlight.

so that the lights point to either side of the road. Inside the headlight and directly in front of the lamp, is another small spherical reflector. This secondary reflector is adjustable and its purpose is to prevent any of the filament rays from passing directly through the lens. Instead these rays are sent back to the

parabolic reflector and so, there is perfect control of the light rays inside the headlight. There are no stray rays, as in the usual headlights. It is these strays which cause the glare in ordinary headlights no matter how well they are focussed.

The rays pass through the special amber lens which provides the beam with its particular characteristics. Each beam, directed from the fog headlight, runs out in a straight line from a point about six feet in front of the wheels to a point almost 100 feet ahead of the car. The beam is clean cut on each side and has about the same intensity through its length.

To the driver approaching it on a clear night, the fog-piercing beam does not appear as a blaze of light, as do the usual headlights, but as two amber parallel beams, running along the side of the road, emanating from twin amber points on the approaching car. There is no glare.

Fog has a tendency to hang just above the ground. The effectiveness of the new lights, it is claimed, lies in their ability to skim under the bottom of the fog line and to reduce the effect of the diffusion wall upon the human eye.

Growing a Potato Without Starch

DIABETICS who are very fond of potatoes now may not have to give up their favorite dish, as the result of the development of a starchless "spud," which has been accomplished by Doctor Harold Hibbert, Professor of Industrial and Cellulose Chemistry at McGill University, and Doctor R. F. Suit, Professor of Plant Pathology at MacDonald College.

Doctor Hibbert describes as follows the method of producing the new potato in which the starch has been displaced by a complex sugar called inulin:

"The idea presented itself that perhaps it might be possible to alter a given plant species by introducing into the growing plant either the living organisms, bacteria, or the enzymes which these bacteria create.

"We selected for this purpose the potato plant in which the enzymes (in the course of plant growth) under the influence of light convert the carbon dioxide and water present in the air first into sugars and then into starch.

"A foreign bacterial culture, which was more nearly associated with the inulin type of sugar-forming bacteria, was introduced into the young, growing potato plant.

"The culture found its way into the roots from a supply located on a stout stem. Within a few days the new bacteria formed a potato that was starchless."



An Old Twelve-Foot Gun. Designed for Shooting Game at Great Distances. It Is a Muzzle-Loader, Using Powder and Ball and Had to Be Fired While Supported on a Rest Because of Its Great Weight.