

PHYSICS—ENGINEERING

Electrons Time Lightning And Paint Its Portrait

Sweeping Across a Photographic Film at Speeds Up to 18,000 Miles Per Second, Beam Pictures Flash

A BEAM of electrons sweeping back and forth across a photographic film at speeds up to 18,000 miles per second, a tenth that of light, times a lightning flash to a few billionths of a second, measures the current and voltages, and draws a picture of the oscillations.

This is the ultra-fast oscillograph described by E. J. Wade, T. J. Carpenter, and D. D. MacCarthy, all of the General Electric Company, Pittsfield, Mass., at the meeting of the American Institute of Electrical Engineers in Chicago.

The instrument was developed for research on lightning arresters to determine the duration, intensity and character of the electric surges that occur when the arrester is struck by lightning. Artificial lightning was used.

One film showed a flash which died away in about a ten-millionth of a second. During that time, however, 11.3 oscillations occurred. Thus the electron beam swept back and forth this number of times across the film or at the rate of 113 million times a second, and attained a maximum "writing speed" of 18,000 miles a second.

The instrument, a veritable time-microscope, can of course be used in any other cases where "transients" or electrical actions of exceedingly short duration are involved. The ordinary oscillograph is used in television, in determining the wave forms of alternating currents and in many electronic devices. It has even been used in geophysical prospecting for oil.

Science News Letter, July 4, 1942

Replaces Swiss Sapphire

SWISS sapphires for the pivot bearings of small electrical instruments have been cut off by the war just at the time when our armed forces and war industries need millions of these instruments. A substitute jewel has been developed, composed of a special hard glass, which has been found by many tests to be satisfactory. Mass production of the new jewels has already begun.

This announcement was made by F. K. McCune and J. H. Goss, both of the General Electric Company at Lynn, Mass., at the meeting of the American Institute of Electrical Engineers.

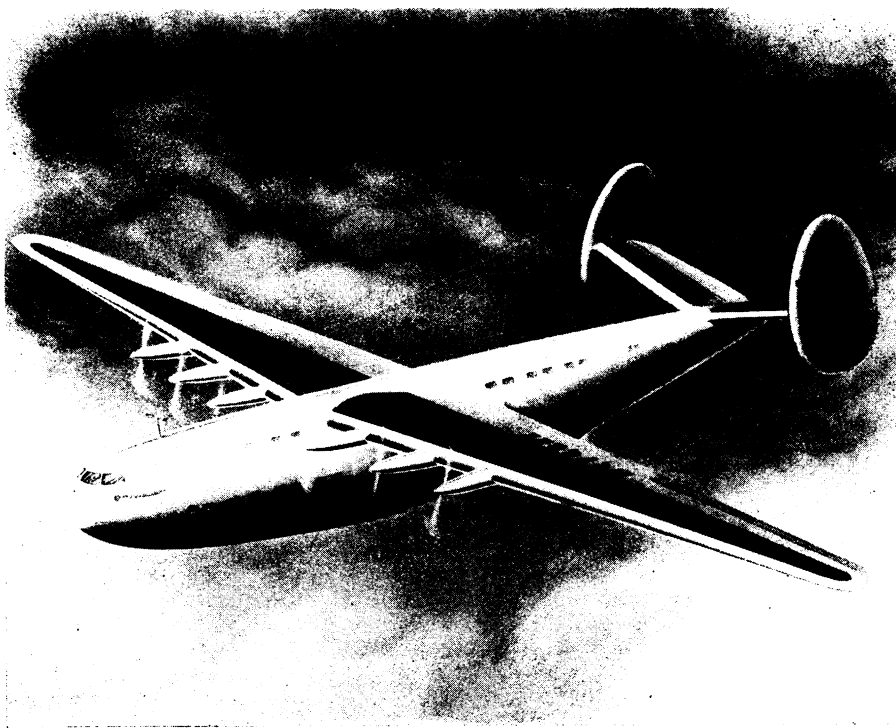
Jewels are essential because the moving systems of these miniature instruments are of watch size and delicacy. Indeed, with the hairspring frequently used to restore the pointer to zero, the system looks much like the balance wheel of a fine watch. An extraordinarily small amount of power is required to move the system. Thus the power consumed by a 40-watt lamp would run 1,000,000

instruments, and even 100,000,000 of the most sensitive ones.

Twenty-five years ago the General Electric Company used hard glass bearings for its small instruments and continued to do so for several years. But with the introduction in Europe, principally in Switzerland, of the synthetic sapphire, identical in composition with the natural stone, the glass bearings were abandoned. When the sapphires were cut off the company again explored the possibilities of the hard glass bearing.

Several advantages are claimed for it. The bearing must be very accurately shaped to prevent all but the minutest side and end play. The bottom of the V-shaped depression in which the pivot rests must be accurately spherical in shape, with a radius of three to four thousandths of an inch. This was very difficult to accomplish with the hard sapphire, but there is no such difficulty with the glass.

Even the inferior hardness of the glass is claimed an advantage. It is of about the same hardness as the steel



HONORED

For this design for a 250,000-pound flying ship and for the 140,000-pound Mars, now largest flying boat in the world, Glenn L. Martin won the American Design Award. This new ship, if built, would be able, it is stated, to carry 102 passengers, each with 80 pounds of baggage plus 25,000 pounds of mail and cargo. It could make the trip to London in 13 hours. As military transports, Mr. Martin said, such ships would be able to carry large numbers of troops and heavy supplies.

pivot. If the instrument is dropped both will be equally injured, and this may affect the performance of the instrument but little. In a similar accident with a sapphire bearing the pivot takes the whole punishment. The point is mushroomed and the needle sticks.

But in any case, the lack of European sapphires will not hold up the production of such fine mechanisms as delicate measuring instruments for radio, radiolocators, and electronic control devices for the panel boards of airplanes.

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MEDICINE

Regression of Breast Cancer Follows Sex Gland Operation

REGRESSION of an inoperable breast cancer that had spread to the bones and relief of persistent, troublesome pain in the bones and healing of the cancerous areas in the bones followed a desexing operation (castration) in a 72-year-old man, Dr. Joseph H. Farrow and Dr. Frank E. Adair, of Memorial Hospital, New York City report (*Science*, June 26).

It is only four months since the operation and the case is not reported as a cure for cancer, but the doctors state:

"Control of disease as extensive as that observed in Case II is unusual. It may be unassociated with the operative procedure employed, although this appears improbable."

Case I, also a man with breast cancer that had spread to the bones, was given a different type of treatment, consisting of injections of male sex hormones. This

treatment not only failed to halt the progress of the cancer but seemed to speed the activity of the cancer both in this patient and in three women to whom the same treatment had been given.

The two types of treatment were tried because of evidence from earlier studies. These suggested that patients with breast cancer might have a defect in body chemistry which would change the sex hormones in the body into another chemical. This second chemical might be able to weaken the bones, making them ready prey to the spreading cancer, or might stimulate the growth of cancer that had spread to the bones. A systematic study is now in progress to learn the effect of upsetting the sex hormone balance on the course of inoperable, spreading breast cancer. From such studies, it is hoped, may come knowledge of how to control this kind of cancer.

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MEDICINE

First Commercial Production Of Spotted Fever Vaccine

A VACCINE to protect against dangerous Rocky Mountain spotted fever and a promising serum for treatment of people sick with the disease are now being produced by Lederle Laboratories, Inc.

The Lederle Laboratories is the first commercial organization to apply for and receive a license from the U. S. Public Health Service to make the vaccine. Hitherto it has been available only as produced at the federal health service's laboratory at Hamilton, Mont.

The Lederle vaccine is made from chick embryo by the yolk sac method

devised by Dr. Herald N. Cox, U. S. Public Health Service. This vaccine was used extensively by the federal health service during 1941 with results as good as those obtained with the earlier vaccine developed by the U. S. Public Health Service, which was made from infected ticks. The tick vaccine, according to earlier reports, protected all but 64 out of 15,000 vaccinated persons in Rocky Mountain spotted fever regions.

One other firm (Sharp and Dohme) is also making the serum for treatment of Rocky Mountain spotted fever. The National Institute of Health in Wash-

ington, D. C., has a limited quantity of serum for treatment of suitably selected cases from which to judge further the value of the serum. Evidence from laboratory studies and a limited number of human cases so far treated is good.

Rocky Mountain spotted fever, although first discovered in the Rocky Mountain states, has now been reported from all but the five New England states and two states in the north central region. About 75 cases each occur in Maryland and Virginia each year, with a 20% mortality.

A total of 147 cases for the entire nation have been reported to the U. S. Public Health Service in Washington so far this year, with the usual increase in numbers in late spring and early summer. For the week ending June 13, there were 26 cases, of which 16 were in the Rocky Mountain states and the rest were in Maryland, Virginia, North Carolina, New Jersey and Illinois. The disease is spread by ticks.

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NUTRITION

Food to Assure Reasonably Adequate Diet Through 1943

"THERE will certainly be enough food to assure everyone of a reasonably adequate diet through the rest of this year and 1943," Oris V. Wells, of the U. S. Bureau of Agricultural Economics, told members of the American Home Economics Association at their meeting in Boston.

This would be true, he said, in spite of the fact that American farmers are faced with the "difficult task" of producing enough food to "maintain domestic food consumption at about its average level in the United States as well as to supply the quantities of several foods that are needed for lend-lease shipment."

We here in the United States have been eating about the same total amount of food each year since 1909, Mr. Wells said, although we have made several significant shifts within the total amount.

We eat fewer potatoes and less of cereal products, especially flour and cornmeal. We have been eating more sugar, increasing our consumption of this chiefly between 1920 and 1925. We have been eating about the same amounts of eggs, butter and meat each year, but have been taking more condensed milk, ice cream and cheese, and following World War I we began to drink more fluid milk and cream.

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