

GEOPHYSICS

New Star Camera

Engineers, surveyors and astronomers can find their location by photographing night sky overhead simultaneously with clock face.

► A NEW sky camera that enables engineers, surveyors, and astronomers to determine their location, by photographing the night sky directly overhead, was reported by Lt. Julius L. Speert of the U. S. Army Air Corps, at the meeting of the American Geophysical Union in Washington, D. C.

The new camera takes a standard 4 by 5 inch plate and is set on a tripod so that it photographs a portion of the sky directly above, showing the stars in the vicinity of the zenith. Attached to this camera is another smaller camera, usually 35 millimeter size, which takes a picture of a clock at the same instant as the photograph of the stars is taken.

With this information, the sky-photographer can determine his exact location.

To simplify the problem of identifying the stars photographed, a special light box has been developed. The light box contains a glass window which is illuminated from behind. Directly back of the glass plate there is a long strip of thin film mounted on two spools. On the film is drawn a special diagram covering the full region from the equator to the pole, and to the same scale as the photographic plates.

With the star photograph, and the time it was exposed known, and the approximate longitude of the point at which the exposure was taken also known, it is possible to determine the exact latitude within one or two seconds, by placing the photograph on the glass window of the light box and moving the film into the proper position.

With these data the stars may be quickly identified by referring to any competent star map or catalogue of stars.

Science News Letter, June 10, 1944

Small Earthquake Recorder

► THE DEVELOPMENT of a new electronic amplifying device, operated by batteries, that can be used to magnify and record near and distant earthquakes was reported to the meeting by Dr. Fred Keller of New Kensington, Pa.

The new device is smaller, making it more convenient to operate and less expensive to run, since it records earth

tremors on smoked paper or with ink instead of using the costlier photographic method.

The new recorder was designed for battery operation, with separate batteries for the galvanometer lamp, photo-electric cell and amplifier circuits, in order to obtain constant illumination and uniform voltages.

In operation, the earth tremors are picked up by an instrument called the seismometer and transmitted by a beam of light focused on a photo-electric cell. The photo-cell then sets up an electric circuit which causes a stylus to move, registering the data on the smoked paper.

The markings on the smoked paper depend upon the strength of the beam of light on the photo-cell.

The smoked paper chart is nearly a yard long and is coiled on a drum which

is turned by clockwork, moving at the speed of more than one inch a minute. The tape is kept short for sake of compactness; however, eight recordings may be made on a single strip of tape, which is 8.5 inches wide, providing four hours of continuous recording from a single tape. However, the equipment is only operated at periods of eight or ten seconds at a time.

"Electronic amplifying and recording devices can also be used to advantage for the magnification and recording of earth motion, especially where photographic methods would not be convenient or economical," Dr. Keller concluded.

Science News Letter, June 10, 1944

Automatic Navigator

► A NEW air navigation instrument that enables a fighter plane pilot to determine his location automatically, without having to make lengthy computations, was proposed by Dr. T. A. Jagger of the University of Hawaii, to the American Geophysical Union. The new device would be a boon to fighter pilots who are tired after long flights, or fighting the enemy in the sky, and must take



GUN-CAMERA TEAM—The nose of a P-38 airplane has been opened to show you the camera installed there by Materiel Command experts of the Army Air Forces to photograph enemy planes at the instant that they are being shot down by the guns above. This is an official photograph.

their bearings in order to return to their aircraft carrier or base.

The device consists of a mirror, a lens, and a small star map showing each star in its correct position in relation to the rest of the stars. By adjusting the mirror so that it reflects images of the actual stars in the sky onto the stars on the printed sky map, and looking through the lens, the pilot can determine his

field of vision. Then by referring to a special graphic chart and to his watch, he can automatically read his exact location in latitude and longitude.

By using this new instrument, it is expected that pilots will be able to make the necessary calculation in a matter of seconds. Now it takes several minutes to perform the figuring, and an error made by a tired pilot may have serious results.

Science News Letter, June 10, 1944

PHYSICS

Post-War Betatron

Plans for a 250,000,000-volt machine to open new fields of research by bringing cosmic ray effects into the laboratory.

► PLANS for the post-war construction of a 250,000,000-volt betatron, also called the rheotron, the most powerful X-ray and atom-smashing machine ever built, which will open wholly new fields to scientific research by bringing cosmic ray effects into the laboratory, were announced by Prof. G. M. Almy of the physics department, University of Illinois.

The new betatron will be similar to the 225-ton cyclotron, another type of atom-smasher, in size, shape and method of operation. It is constructed so that a powerful magnet surrounds the doughnut-shaped accelerating chamber. One of the distinguishing features of the machine is that it whirls electrons, the lightest constituents of the atom, while the cyclotron whirls the deuterons, or heavier parts. It does this operation in one "kick," while the cyclotron requires many "kicks." In the betatron the magnetic field changes, while in the cyclotron it remains constant.

Three betatrons have already been designed by Prof. Donald W. Kerst of the University of Illinois. Two of the machines, one having an eight-inch accelerating chamber and producing 2,500,000 volts, and the other having a 20-inch accelerating chamber and producing 20,

000,000 volts, are located at the University of Illinois. The third betatron, much larger than the first two, produces 100,000,000 volts and is located at the General Electric Company laboratories in Schenectady.

"The first 2,500,000-volt betatron proved the idea workable. The 20,000,000-volt betatron in its two years of operation has made several valuable contributions to the knowledge of atoms, electrons and X-rays, and has opened the possibility of its use for the deep treatment of cancer by sending the electrons directly into the body of the patient, a whole new field of high energy physics," Dr. Almy stated.

At present the 20,000,000-volt betatron is being used for research in the above fields.

Dr. Almy pointed out that increasing the energy to 250,000,000 volts opens wider the field of cosmic rays to new phenomena of the deepest significance.

It is believed that a 250,000,000-volt betatron will also provide a laboratory source of mesotrons, heavy electrons, particles of fundamental importance in studies of atomic nuclei and of, as yet, unknown practical usefulness.

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AGRICULTURE

Hillculture for Erosion

► COMMON WEEDS successful in checking erosion of productive cropland are regarded as more valuable than wheat or corn, it was announced by the Department of Agriculture.

At a time when obtaining a maximum

yield per acre is vital to victory, the U. S. Soil Conservation Service is developing new and more effective ways to halt fissuring and cross-wash of top-soil, which have already ruined 50 million acres of American farmland.

On the Department of Agriculture's 1,700 acre experiment station at Beltsville, Md., northeast of Washington, an effort is being made to single out those strains of plants that make the best growth on poor, eroded soils, require a minimum of cultivation, and at the same time bring in the best income for the farmer. This phase of conservation is called hillculture because it is designed

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