

elevation and direction between the camera station and the recorded flashes and correlating these data with the rate of the balloon's ascent, a complete and accurate record of wind velocity and direction is easily obtained.

Previous method of charting winds of the upper air has been to release a balloon and to follow its course with a theodolite with which the investigator reads the angles of elevation and direction every half-minute or minute.

At night, research workers have hung a paper lantern containing a lighted candle from the balloon and followed this light. The candle, of course, is very dim and its light is lost rather quickly. Some observers have been known to plot the course of stars, thinking they were trailing the lantern.

The Spilhaus method, however, prac-

tically eliminates this "human equation" and even the most inexperienced observers can easily make rapid and accurate readings photographically. The set-up is all but automatic—all the observer has to do is to open the camera shutter and release the balloon after he has lighted its fuse.

In preliminary tests the flashes have been recorded at distances as great as seven miles and at heights in excess of 13,000 feet. Meteorologists expect, however, that both this distance and this altitude can be greatly exceeded.

Formal announcement of the new method was made by its inventor at the meeting of the American Meteorological Society at the United States Weather Bureau in Washington, D. C.

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One possibility is that the whole radio equipment, transmitter as well as antenna, can be put underground at the landing field's center.

Two Berlin scientists, Ernst Kramar and C. Lorenz, discussed the principles of blind landing radio system applied in Germany based in part on the earlier American system.

*Science News Letter, May 8, 1937*

#### GENERAL SCIENCE

## 15 Scientists Honored By Election to the Academy

**F**IFTEEN new members of the National Academy of Sciences were elected at the Academy's meeting. Membership in this organization is one of the most distinguished honors within reach of American scientists.

Ten of the new members represent the "natural" sciences—biology, geology, medicine, psychology, etc.: Dr. C. B. Bridges, California Institute of Technology; Dr. E. W. Goodpasture, Vanderbilt University; Dr. C. G. Hartman, Carnegie Institution of Washington; Dr. D. F. Hewett, U. S. Geological Survey; Dr. Leo Loeb, Washington University (St. Louis); Dr. D. A. MacInnes, Rockefeller Institute for Medical Research; Dr. G. R. Minot, Boston City Hospital; Dr. F. B. Sumner, Scripps Institution of Oceanography; Dr. Charles Thom, U. S. Department of Agriculture, and Dr. E. C. Tolman, University of California.

Five represent the "exact" sciences—physics, astronomy, mathematics, etc.: Dr. Oliver Ellsworth Buckley, Bell Telephone Laboratories; Dr. Arthur Jeffery Dempster, University of Chicago; Dr. John von Neumann, Institute for Advanced Study; Dr. Seth B. Nicholson, Mt. Wilson Observatory; Dr. Otto Struve, Yerkes Observatory.

Prof. August Krogh of the University of Copenhagen, Denmark, noted for his research in animal physiology, was elected as a foreign associate of the Academy.

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In 1918, army tanks usually ran less than 100 miles between major overhauling of the mechanism; now tanks generally run several thousand miles without mechanical failure.

A survey of existing roads to find out what the country has, and needs, in its highway system is to be made by over 40 states working with the Federal Government.

#### AVIATION

# New Blind Landing Beacon Has Antenna Underground

## Pit Antenna Is Found to Give Steeper and More Satisfactory Approach Path for Landing Airplanes

**A** NEW radio landing beam that emerges from an underground pit and holds great promise for making blind landings of airplanes practical and safe in foggy weather has been described by two National Bureau of Standards scientists, H. Diamond and F. W. Dunmore.

The transmitting antenna is placed in a special subterranean compartment under the center of the landing field instead of being erected dangerously in the air at the edge of the field. The Bureau of Standards scientists had their preliminary work done and ready to report two years ago but the interest of another government bureau delayed the scientific announcement. The recent scientific paper before the joint meeting of the International Scientific Radio Union and the Institute of Radio Engineers was the first public report.

About six years ago the same group of government scientists developed a radio beacon system for aircraft landing fields which was so effective that after demonstrations in this country it was adopted and put into extensive use in Europe, Japan and Russia. It has not been installed as regular equipment on American landing fields, however.

The new pit antenna improves this radio landing beacon. In the landing system, the airplane glides down a path that is marked by equal strength of radio signal, indicated on a convenient dial on the plane's instrument panel. The way that radio waves travel from the transmitting antenna makes this system possible. One kind of wave goes directly from the antenna to the plane, while another goes from the transmitting antenna to the ground and then is reflected to the plane.

The interference of these two waves and decreasing distance combine to allow the plane pilot to steer his craft along a radio path to a happy landing even if he can not see the landing field.

When the transmitting antenna is in the air at the field's edge the path of the landing glide was a little too flat. Now the pit antenna gives a steeper and more satisfactory approach path. A further advantage of the underground system is that it can be built on a turntable and swung around to conform to wind direction, thus allowing landings from any direction to be made with the aid of only one antenna. Previously several antennae at the edges of the field were necessary.