

PHYSICS

Ideal Standard of Length

Mercury made by neutron bombardment of gold produces a light wave which is most precise standard of length yet devised.

See Front Cover

➤ MERCURY, made from gold in the atomic pile by neutron bombardment, has now been obtained in large enough quantities to perfect methods of measurement by the most precise standard of length yet devised. This unit is a single wave of green light from a form, or isotope, of mercury with an atomic weight of 198 and, therefore, known as Mercury 198.

Research laboratories for a number of years have been using light waves for special types of length measurements, but the use of this isotope known as Mercury 198 provides precision not available before. The National Bureau of Standards, which now has Mercury 198 in reasonable quantities and has developed practical methods for its use in measurements, states that the discovery makes possible an "ultimate standard of length." The legal standard is a meter bar kept in the vaults of the Bureau.

University of California scientists announced the process a year ago. It was by means of a cyclotron at the university that gold was transmuted to Mercury 198. Quantities obtained were very small. The Bureau's work, carried out by Dr. William F. Meggers, is a refinement of other processes plus the development of mercury lamps and measuring procedures.

Measurements based on this mercury green light wave, which is 21 millionths of an inch long, will make possible length determinations precise to one part in 100 million. Such precision in the measurement of length has never before been attained by man, Dr. E. U. Condon, director of the Bureau, declares.

The advantages of a light-wave standard over a physical standard are that it is indestructible and exactly reproducible, he says, and that any laboratory with the necessary auxiliary equipment can have a basic standard on the premises.

Cadmium red radiation was adopted provisionally at the 1927 International Conference on Weights and Measures as

a wavelength standard. The fundamental advantage of Mercury 198 over cadmium is that it emits a more nearly perfect monochromatic light. By this is meant that the red, green, or other color used, is a single wavelength rather than multiple wavelengths extremely close together.

Cadmium consists of six principal isotopes that radiate slightly different waves. Other advantages of mercury are that it does not need special heating equipment as does cadmium, and that the human eye is seven times more sensitive to green light than to red.

Dr. Meggers is now experimenting with a number of lamps for using the mercury. The simplest is a glass tube the size of a cigarette with Mercury 198 sealed inside it. When excited by high-frequency radio waves, the mercury

glows and gives off energy in the form of light as shown on this week's cover of the SCIENCE NEWS LETTER. The Bureau expects at a later date to have lamps of this sort available for other scientific laboratories.

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AERONAUTICS

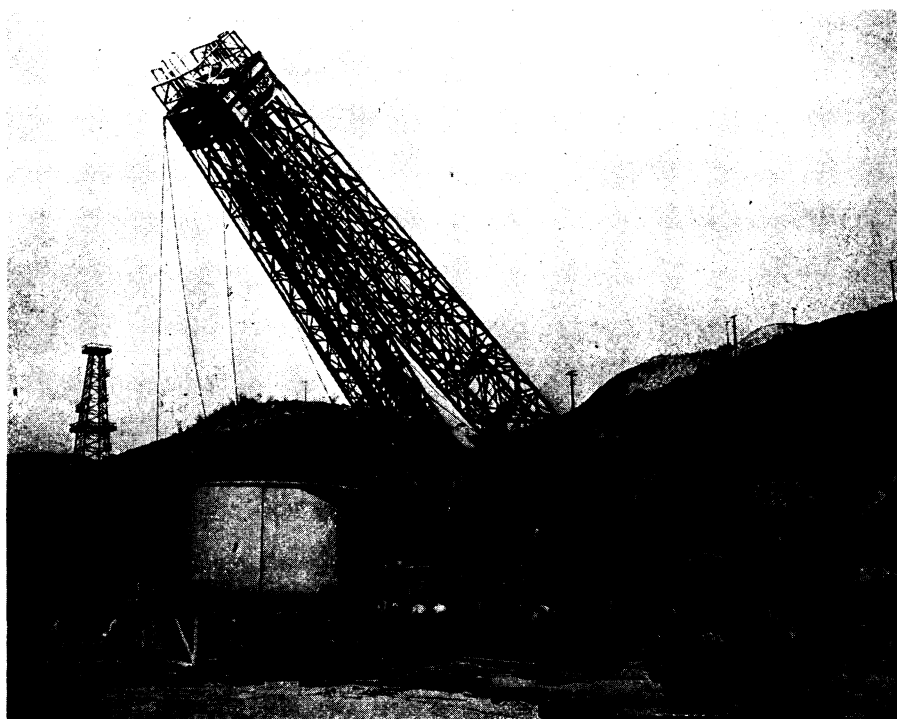
Skyway for Private Planes Links Canada and Mexico

➤ A SECOND skyway for private planes is planned by the Civil Aeronautics Administration. It is a 40-mile-wide route from Canada to Mexico, extending first from Pembina, N. D., to Laredo and Brownsville, Texas, but eventually from Winnipeg to Mexico City.

The skyway is intended solely for visual flying, and its use will keep private planes off commercial airlines and promote safety in the air. An airmarking program along the southern end of the skyway is already under way.

This route, to be known as Skyway Eleven, is the second airway for private planes sponsored by the CAA. The first, Skyway One, extends from Washington, D. C., to Los Angeles.

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PORTABLE DERRICK—This first completely portable electric oil well drilling rig is capable of boring two miles into the earth. Weighing 18 tons, its twin-masted derrick reaches as high as a 12-story building. It can be telescoped, folded and moved along the highway, which is expected to check rising drilling costs and increase the rate of well completions.