fashion each second. In America sources of neutrons have been developed which are capable of giving off 100 times this number per second.

It is only since the beginning of 1934 that the technique of creating artificial radioactivity in normally stable elements has been known to the world of science. On January 31 Irene Curie (daughter of Madame Curie, discoverer of radium) and her husband, F. Joliot, announced that by bombarding the elements boron, magnesium and aluminum with the heavy cores of helium atoms they were able to create transitory radioactive forms of nitrogen, silicon and phosphorus.

Substantiation of the Curie-Joliot experiments followed swiftly from the Cavendish Laboratory at the University of Cambridge, England, and from the California Institute of Technology and the University of California. In England the favorite atomic bombarding particles have been the cores of hydrogen atoms—the protons. In the California experiments the cores of the new heavy hydrogen—the deutons—have been driven at a variety of elements to produce artificial radioactivity.

Work prior to that of Dr. Fermi on the creation of artificial radioactivity has all been accomplished by using relatively light-weight elements as targets. That the same phenomena could be produced in the heaviest and most complicated atom of all, uranium, was unknown. For uranium, and the whole series of elemental offspring which finally ends when lead is reached, it was known that natural radioactivity was occurring, with the elements gradually turning into substances of slightly less weight. Many experiments seemed to indicate that nothing man could do would change the rate at which the natural disintegration occurred, either to slow it down or speed it up. If Dr. Fermi's work on the creation of element No. 93 is substantiated later by other scientists it will be the first case where the sequence of natural radioactivity change has been altered.

Science News Letter, June 16, 1934

PHYSICS

Transmutation May Yet Be Put to Practical Uses

By DR. R. M LANGER, Physicist, California Institute of Technology.

IF THE process of making heavier radio-active elements out of lighter ones, reported discovered by Prof. Enrico Fermi in Italy, can be made efficient enough it may lead to a practical method of creating useful radioactive substances for medical purposes or scientific study.

When neutrons strike the nucleus of a light element they try to make trouble by kicking out an alpha particle or helium atom core. If this proves too difficult they bounce out themselves.

Never in the past have they been found to join the nucleus in peace. Still, physicists have felt that in the stars or wherever else matter is built up many such peaceful unions must take place.

Now the Italian physicist, Fermi, reports he has made neutrons stick to the heaviest element known, namely, uranium, which has almost 238 times the mass of hydrogen, the lightest element. If this proves true a new element will have been formed heavier than any known heretofore.

The heavy product seems to shake off an electron and this causes it to break the record for highest nuclear charge, namely 93. It may be that one of the lighter forms of uranium is attacked. In this case the mass would be only 235 but the nuclear charge would still be 93.

Apparently this process may be very efficient because the uranium nucleus is so heavy, large and complex that the neutron can fritter away its excess energy within the uranium and then be too exhausted to leave. After a few seconds an electron leaves instead and then the fun begins. For the new element is radioactive and keeps changing by sending out alpha, beta and gamma rays until lead is formed.

The first problem that the new experiments are likely to solve is the old mystery of the source of the actinium series. Apparently nature has been doing slowly what Prof. Fermi just learned to do rapidly.

Science News Letter, June 16, 1934

PHOTOGRAPHY

Largest Precision Camera To Copy Charts

THE WORLD'S largest precision camera, 31 feet long and weighing 14 tons, so big that its operators work inside of it, has just been placed in operation for reproducing nautical charts and airway maps more than 4 feet square.

So precise is the work of this huge camera, which resembles a railway trestle in structure, that cork pads and other vibration-damping provisions must be used to eliminate the slightest building tremors, although it has been installed directly on the foundations of the new Department of Commerce building.

Capt. R. S. Patton, director of the U. S. Coast and Geodetic Survey, states that this gigantic instrument will make it possible to photograph a complete chart on one negative, with a probable error of not more than two-thousandths of an inch. Two years were devoted to its design, construction and adjustment, at a total cost $15,240. Copyboards weighing a ton slide easily along steel tracks and do not spring the frame more than one hundredth of an inch.

In order to get the greatest accuracy possible every available source of information was consulted from the designs of commercial copying cameras to reports of technical experts at the National Bureau of Standards. The preliminary designs were made at the Sight Shop of the Naval Gun Factory.

Science News Letter, June 16, 1934

AGRICULTURE

Mexico Seeks Wheat To Grow in Tropics

AN AGRICULTURAL experiment station in the hot lowlands of Guerrero, Mexico, is trying out several kinds of wheat to see if some of them might not be adaptable to the tropics. Mexico lives on corn, a grain biologically less efficient than wheat.

Although the mountain highlands raise wheat, white bread is a luxury to Indians.

Experiments with different varieties of wheat are being made on the high central plateau to improve present production in wheat raising areas. The Japanese soy bean is being tested for Mexican adaptability. Because of its high protein value this bean might serve to supplement the inefficient native diet.

Science News Letter, June 16, 1934