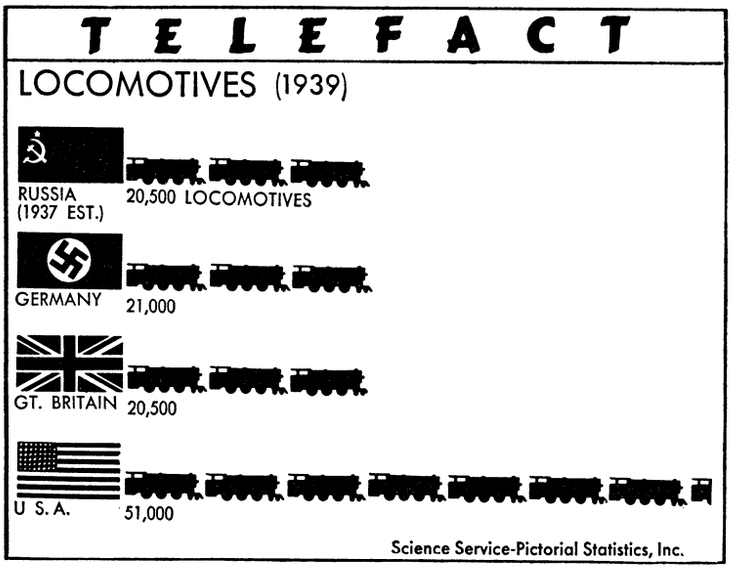

PHYSICS

Long-Sought Chain Reaction In Fission of Uranium Found

Discovery Is Essential Missing Link Leading Toward Possibility of Liberating Energy of the Atom

THE LONG-SOUGHT "chain" reaction in uranium fission, in which one uranium atom splitting sets off the fission of another, and so on with each releasing atomic energy in large amounts, is reported by four French scientists.

If science is ever to create a source of atomic power by the liberation of atomic energy in uranium splitting with low-energy neutral particles (neutrons), then chain reactions will be needed to make the fission self-perpetuating.

Ever since the first reports of uranium's splitting, a little over a year ago, scientists have searched in vain for the crucial chain reaction. It has remained for Dr. H. von Halban, Jr., Prof. F. Joliot, a Nobel Prize winner, Dr. L. Kowarski and Prof. E. Perrin of Paris to find the chain effect. (*Journal de Physique et le Radium,* October) They report that the chain effect is convergent, gradually weakening and coming to an end.

This result, at first sight discouraging for those who have envisioned atomic power, is only for the particular geometry of the experiment they have performed. Whether it would also be true for other experimental arrangements is not known. Perhaps it could be improved.

During the year of feverish research on uranium splitting which has now elapsed, the number of neutrons liberated by each uranium fission (without chain reactions) has been measured in both Europe and America. It comes out that between 2 and 3.5 neutrons, on the average, are liberated per fission. The test of a chain reaction is to compare this number of neutrons (without chain reactions) with the number of neutrons produced by fissions plus chain reactions.

This the French scientists have done, and they find that eight neutrons are liberated per primary uranium fission, whereas previously they had reported only 3.5 neutrons per fission. The difference, they conclude, is the evidence for the long-sought chain reaction and due to secondary and tertiary effects in the chain.

As a basic source of neutrons the French scientists used a mixture of 160 grams of beryllium mixed with one gram of radium. They allowed neutrons created by this source to bombard 300 kilograms (661 pounds) of uranium oxide contained in a copper sphere 50 centimeters in diameter. The copper sphere itself was immersed in a tank of water.

To detect the neutrons present they used detectors of dysprosium placed inside the copper sphere and in the surrounding water. The radioactivity produced on these detectors gave them a measure of the number of neutrons present in various parts of the system.

Goal of uranium fission experiments, from the practical standpoint, has been to produce a chain effect, which would liberate atomic energy (175,000,000 electron volts per fission) and yet remain under control. The fact that the new French experiments are convergent, gradually dying out, may mean one of two things. Either the energy liberation by the chain reaction is difficult to achieve and keep going, or that the scientists intentionally used an experiment which would give a convergent and thus be safe to carry out.

The new results are reported in the French scientific publication, *Journal de Physique et le Radium.*

Science News Letter, February 10, 1940

CHEMISTRY—AGRICULTURE

New, Cheaper Disinfectants For Hoof-and-Mouth Virus

NEW disinfectant treatments for ridding imported hides of the virus of dangerous hoof-and-mouth disease, developed in joint research by scientists of the U. S. Department of Agriculture and the University of Cincinnati, have been officially approved for use by the Bureau of Animal Industry. Because of their greater effectiveness and lower cost, it is expected that they will be widely employed.

The new treatments consist of immersing the hides for 24 hours or more in a 1-to-10,000 solution of sodium bifluoride, or in a 1-to-7500 solution of sodium silicofluoride. The disinfectant treatments hitherto in use have depended mainly on corrosive sublimate, which is many times more expensive, and also has a deleterious effect on the hides.

The research work was done by Dr. Adolph Eichorn, director of the Animal Disease Station of the Bureau of Animal Industry, situated at Beltsville, Md., and by Dr. Fred O'Flaherty, director, and E. E. Doherty, bacteriologist, of the leather research laboratory maintained at the University of Cincinnati by the Tanners' Council of America.

Science News Letter, February 10, 1940