watering is needed, the tanks are replaced by a conveyor belt for manure, soil, snow, etc. Attached to the combine are special devices, including a soil leveler, a row marking and sowing machine, a cultivator, a machine for earthing up, a harvesting platform and a special attachment for the production of naphthalene gas to combat field pests.

The combine is propelled by a 3-kilowatt electric motor. Mechanized cultivation is claimed to raise the harvest yield in the hotbeds by 40 to 80 per cent. It takes the combine eight hours to till 2.6 hectares (6½ acres) of hotbeds and one minute to sow an area of 36 square meters (43 square yards).

Production of the new combine was started this year.

Vagan Mkrtchian got the idea of such a machine while he was engaged in hotbed farms in Armenia. It took him three years to design and develop it. At present Mkrtchian is a scientist on the staff of the Scientific Research Institute of Vegetable Gardening in Moscow.

Science News Letter, August 19, 1939

CHEMISTRY

United States Leads World In Chemistry; Germany 3rd

LEADERSHIP in chemistry throughout the world is now in possession of the United States, it is disclosed in a report submitted to the American Chemical Society by Prof. E. J. Crane of Ohio State University, editor of *Chemical Abstracts*.

Germany, which ranked first during the World War period and even a decade ago, has now dropped to third place with Great Britain second. Russia and Japan show striking gains, Prof. Crane reports.

English is predominantly the language of science, the United States and England accounting for 40 per cent of all scientific periodicals published.

The report is based on an analysis of 65,000 abstracts of chemical discoveries reported last year in *Chemical Abstracts*, Prof. Crane explained.

Chemical patents account for much of the leadership of the United States. During the last five years U. S. chemical patents have increased 15 per cent in number over the preceding five years. During this same time British chemical patents have declined 12 per cent, French chemical patents have decreased 23 per cent and German chemical patents have dwindled 30 per cent of their former number.

Science News Letter, August 19, 1939

PHYSICS

New Way To Separate Isotopes Is Quick and Effective

Combination of High Speed Centrifuge with Chemical Fractioning Column Method Reported by Virginians

A NEW way of separating isotopes quickly and effectively is suggested by Prof. J. W. Beams and Dr. C. Skarstrom of the University of Virginia. (*Physical Review*, Aug. 1)

The new method would combine the whirling properties of high speed centrifuges with the chemical fractionating column method employed by Prof. Harold C. Urey, Columbia University Nobelist.

Isotopes are the forms of chemical elements which have chemical properties so similar that ordinary chemical methods will not separate them. Yet they have slightly different atomic weights.

Separating isotopes is one of the major tasks of physicists these days for isotopes can be employed as "tracers" in studying the physiological happenings of the human and animal body and have already contributed much to knowledge of hitherto obscure body processes.

To operate the new method would require a huge centrifuge, weighing tons, for the columns used at Columbia by Prof. Urey are two stories high. An apparatus to whirl them around in a supercentrifuge would be very large.

Search for Neutrino

In the same issue, Drs. H. R. Crane and J. Halpern of the University of Michigan describe their latest search for the elusive and never-found atomic particle, the neutrino, which is believed to have the mass of an electron, without electrical charge.

By bombarding chlorine with deuteron particles from the huge Michigan cyclotron, the scientists have made it emit electrons, or beta rays. Studying the pictures of these beta rays in a Wilson cloud chamber has shown that the ordinary, every-day laws of classical momentum are not observed unless one assumes that another particle (the neutrino) is liberated in the process.

Because of the neutrino's neutral character actual pictures of its tracks have not been obtained, and probably they will never be found. But the scientists have found relationships showing definite directions in space in which the change of momentum occurs. This they interpret as the line of direction of the neutrino.

Split Uranium Atoms

NEW attacks on the secrets of uranium splitting — potential source of atomic power if scientists can ever find out how to create it efficiently and then control it after they have it — were described.

Nobelist Prof. Enrico Fermi and Drs. H. L. Anderson and Leo Szilard, of Columbia University, reported that by bombarding uranium with slow neutrons they obtain a 20% gain in the number of neutrons emitted. This is evidence—slight but probably real—that the splitting of uranium, with its enormous release of atomic power, is probably accompanied by a chain reaction that creates more neutrons to produce more uranium fissions, and so on. The whole question of atomic power is still in the balance for the experiments have yet to give a conclusive answer. The Columbia results are more conservative than reports which have come from French scientists studying this same matter.

Another new finding in uranium's splitting is the study by Drs. J. C. Mou-