

PHYSICS

Gold May Help to Unleash The Hidden Power of the Atom

Apparatus Worth a King's Ransom Made of Platinum or Gold May Separate Uranium Isotopes as a First Step

APPARATUS worth a king's ransom and made of pure platinum or gold may be used by scientists to prove definitely whether or not uranium atoms can be split and used as a practical source of atomic power.

Equipment costing from \$50,000 to \$100,000 might find the answer. Fantastic though such costs would be, the price would be worthwhile if a new kind of power source could be created.

You and your descendants may never use atomic power in your home but it may some day be the potent and compact driving force behind the flights of trans-oceanic airplanes and long-distance bombing planes. If practical uses of this nature can be developed they will come inevitably, for in warfare all costs are thrown out the window if the end result is a military weapon more effective than anything which has come before.

So far it appears that there is not much hope of obtaining atomic power in usable amounts from ordinary uranium. However, power from the rarer kind of uranium having mass 235 instead of 238 is still a possibility. Gold and platinum apparatus will be needed to tame the only kind of uranium compound which—at present—appears to offer the chance of yielding this rarer isotope.

The two isotopes of uranium are intermixed in natural sources. The present theory (yet unproved) of uranium's fission is that it is the rare uranium 235 which can be split in a chain-reaction that might—conceivably—become self-sustaining and be useful as a source of atomic power.

So rare is uranium 235 that enough of it has not yet been gathered in one spot to perform this astounding, historic experiment of attempting to make it keep splitting itself, with each atom releasing large amounts of atomic energy.

Gold and platinum apparatus must be used because the methods of separating isotopes so far developed work best for gases. The only gaseous compound of uranium is corrosive, deadly uranium hexafluoride which would destroy any

apparatus not made of the noble metals.

Right now it appears that the creation of atomic power from uranium's splitting is nip and tuck. If a gram of uranium with mass 238 "burns" it liberates 2,500,000 times as much energy as a gram of coal.

If it is only the rare uranium isotope of mass 235 which "burns"—as now appears probable—then one must divide this figure by the ratio of the isotopes: 140.

This leaves an energy preponderance in favor of uranium over coal of only some 17,800 times. Current prices for uranium oxide are about \$2.00 a pound while coal at the mines is about \$2.00 a ton.

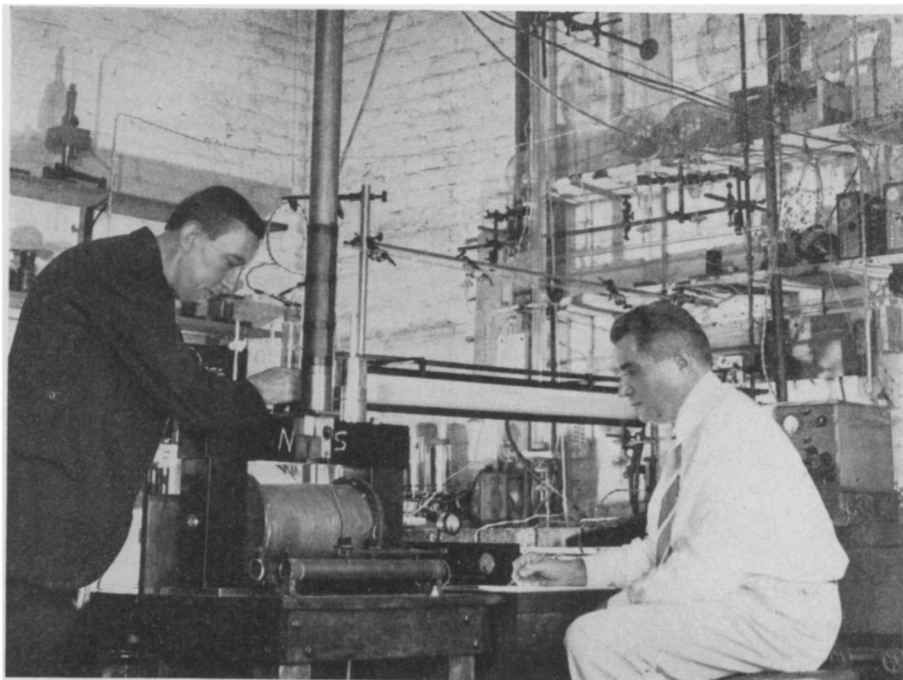
Thus if uranium of mass 238 will burn the system perhaps is feasible, if scientists can figure out how to create and control it. If it is uranium 235

which is needed, however, there is probably not enough uranium in the world to do the job. Present production of uranium in the United States is only 50 tons a year while coal is produced at about 500,000,000 tons a year.

At present scientists in France have reported that for each atomic particle (neutrons) sent into uranium they are able to liberate three neutrons. This means that they potentially have the means of perpetuating a chain reaction. Better measurements in America—and figuring all processes more conservatively—show that the figure is little better than one for one. The present experiments are crude and the experimental errors large so that definite answers are difficult to obtain.

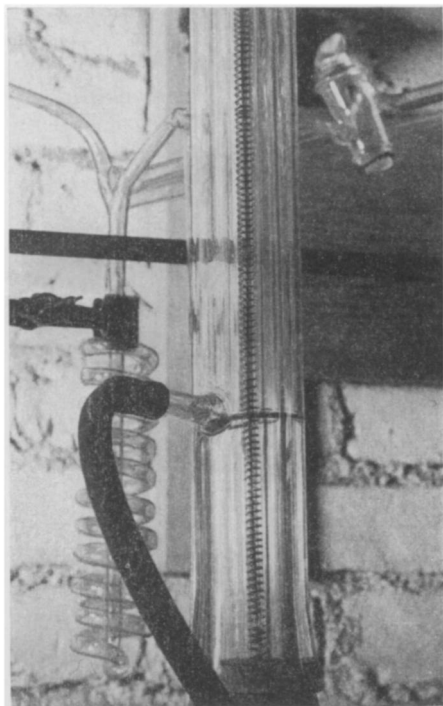
However, looking into the future, Drs. F. Adler and H. Von Halban, Jr., of the nuclear chemistry laboratory of the College of France, Paris, have just reported a means of controlling the atomic power once it has been liberated.

The French scientists suggest that cadmium be placed in the system so that the neutrons will be properly slowed down. From theory they calculate that the system should come to equilibrium at a temperature which would be characteristic of the chemical composition of the uranium products used and with the size of the system.



ISOTOPE "SEPARATOR"

Dr. Arthur Bramley (left) and Dr. A. Keith Brewer, of the U. S. Bureau of Chemistry and Soils, who developed this apparatus for the thermal diffusion method of isotope separation.



HEART OF APPARATUS

This tube which extends ceiling-high in the apparatus on page 392 is where the separation takes place. The tiny inner tube is heated by the coil of wire while the outer tube is cooled by water entering through the black tubing. The temperature difference sets up a swirling of gases causing the separation.

Their scheme—a pioneer method yet untried—may some day correspond to the “drafts and dampers” on a furnace which keep coal burning steadily and under control.

While the French have thus publicly mentioned a scheme which has been in the minds of many other scientists in America—but yet unreported because it seemed ill-advised in the present preliminary stage—there has been a strange and perhaps ominous silence on such matters from Germany, the land where the original discovery of uranium’s splitting was made last summer.

Perhaps, the keen resources of Germany’s regimented scientists are even now at work pushing the exploitation of uranium’s splitting—and its release of atomic energy—for military purposes.

The worries of Americans on this point are real for two reasons. One, the original discovery was made in Germany and enabled them to get a “jump” on the rest of the world if they wished to do so. Two, one of the best methods of separating isotopes is German-made; the method of Clusius on thermal diffusion.

This Clusius method is now exhibiting promise in America on a tiny

experimental scale but it is well-known and long-tried in Germany.

All of this is, of course, conjecture. However, it does have considerable scientific possibility. Indeed there is so much that is true mixed with what may

amount to mere speculation that American scientists are pushing their uranium research diligently to learn, at least, whether atomic power can be obtained in a safe and reasonable form.

Science News Letter, June 24, 1939

PUBLIC HEALTH—BACTERIOLOGY

Advise Precautions Against Horse Sleeping Sickness

Control of Rabies, Yellow Fever, Typhus and Rocky Mountain Fever Also Discussed at Virus Meeting

EQUINE encephalomyelitis, or horse “sleeping sickness,” for years of great economic consequence in the livestock industry, has become an outstanding public health problem with the discovery during the past year that man can contract this horse disease, Dr. Leroy D. Fothergill of Harvard University told the Harvard virus symposium.

The first important control measure, he said, is to use a very effective horse vaccine which has been developed in an effort to eradicate the disease from horses. To prevent its spread among humans, he urged screening against the mosquito carriers. Man could be vaccinated against the disease, he said, but the low incidence does not warrant this now.

Despite this low incidence, however, he urged care, for few viruses are capable of causing infection in such a wide spectrum of different species. The discovery last year by Dr. Fothergill that birds may also have the disease complicates the epidemiology. Primarily a summer and autumn disease, it attacks children more often than adults.

Don’t Shoot the Dog

DON’T shoot a dog suspected of being rabid unless necessary for protection. Instead, capture and quarantine it under observation for a 10-day period. This advice on the control of rabies or hydrophobia was given by Lieut. Col. Raymond A. Kelsner, chief of the U. S. Army Veterinary Corps.

If the dog is killed it is often impossible to tell if it had rabies and diagnosis of the disease in man is possible only through diagnosis of the biting dog. When man shows the symptoms of the disease, it is too late for the

Pasteur treatment, which must begin within four days of the bite to be effective. Bites about the head and face, he recommends, should be treated at once if the dog is suspected, and the dog quarantined. Treatments can be discontinued if the dog proves well.

For control measures, Col. Kelsner urged quarantine of imported dogs, restraining of dogs in an infected community and prophylactic immunization against rabies as an adjunct, not a substitute, to these measures.

He said the danger of the disease was often overemphasized and that while treatment should be given in definite cases, its use to “play safe” was not always advisable.

Yellow Fever Control

AT LAST medicine is in a position to control jungle yellow fever in South America and some advance can be made in Africa, the other great focus of this disease, Dr. Frederick F. Russell, professor emeritus, Harvard University, reported.

Dr. Russell emphasized that control in South America may be more im-

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