

uneconomical in a peacetime sense become practical for military services if they can perform tasks not possible, or carried out as easily, in any other way. No price can be put on such developments that might save the life of a nation which owned the discovery, any more than one can put a price on a surgical operation which saves a man's life.

5. Is Germany pressing the utilization of the discovery of uranium fission? The answer is probably yes, for it has been pointed out since the first announcement of the sensational find that Germany was the home of the original discovery, and that German scientists have had a six months' and more start on their research. (See *SNL*, Feb. 11, 1939)

This drive is going on in all nations and does not require the special large cyclotron atom smashers which dominate the American scientific scene.

The whole virtue of uranium fission for any possible practical applications is that it does not require huge heavy cyclotrons to set off the fissions and release the energy. A little bit of radium

mixed in a flask with beryllium and embedded in a block of paraffin is the entire "source" that is required. This radium-beryllium mixture is a source of neutrons and with these to bombard uranium the uranium splitting and its own chain reaction do the rest.

Those five points are the fancy which may or may not come true within our times. There are others, like the uranium bomb, which go beyond fancy into the fantastic.

Probably the sanest forecast of the future is that uranium atomic power will be so valuable when and if it comes, that it will be used only for the most special purposes for which it is characteristically adapted and which it can do better than anything else.

Uranium fission will probably have its greatest benefits as a ready-at-hand, compact source of neutrons which are highly sought-after in medicine and biological experiments and in nuclear physics. Every university may yet have its own neutron source. (See *SNL*, Mar. 2, 1940.)

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GENERAL SCIENCE

Excerpts From Address By President Roosevelt

The Eighth American Scientific Congress was formally opened on the evening of Friday, May 10 with an address by President Franklin D. Roosevelt. The assembled delegates from twenty-one Republics of the three Americas were the audience.

"... This hemisphere is now almost the only part of the earth in which such a gathering can take place. Elsewhere war or politics has compelled teachers and scholars to leave their great calling and to become the agents of destruction. . . .

"In our search and in our teaching we are a part of a great adventure—an exciting adventure—which gives to us a larger satisfaction even than did the adventure of settling the Americas give to our Founding Fathers. We feel that we are building human progress by conquering disease and poverty and discomfort, and by improving science and culture, removing one by one the cruelty, the crudity and the barbarism of less civilized eras.

"In contrast, in other parts of the world, teachers and scholars are not permitted to search for truth lest the truth when made known might not suit the designs of their masters. Too often they are not allowed to teach the truth as they see it, for truth might make men free. . . .

"You who are scientists may be told that you are responsible because of the processes of invention for the annihilation of time and space, but I assure you that it is not the scientists of the world who are responsible, because the objectives which you have had have looked toward closer and more peaceful relations between all nations through the spirit of cooperation and the interchange of knowledge.

"What has come about has been caused solely by those who would use, and are using, your inventions of peace in a wholly different cause—those who seek to dominate hundreds of millions of people in vast continental areas—those who, if successful in that aim will, we must now admit, enlarge their wild dream to encompass every human being and every mile of the earth's surface.

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Chinese in the fourteenth century recorded their observations of sunspots.

The "life expectancy" of automobiles—like that of humans—is lengthening and cars are now used on the average more than nine years.

PHYSICS

Will Atomic Power Release Come As Gigantic Explosion?

WHEN the power within the uranium atom is released, as scientists hope that it will be by atom-smashing, will it come as a gigantic explosion?

This possibility has some scientists worried. They do not believe the whole earth will explode, but they do fear that the experimenter and his laboratory might disappear in the disaster of a successful experiment.

A particular variety of the heaviest chemical element, uranium of mass 235, has been shown to split and release enormous energy when attacked by a relatively slow and unenergetic atomic particle, called a neutron. In this atomic smash, more neutrons are produced. These are capable of producing more uranium splitting if they score hits on the right kind of uranium atomic centers. And so the explosions might continue, just as they do when powder or TNT explodes, one atom setting off another.

There is plenty of uranium in the earth's crust.

Even neutron bombardment of a fairly rich piece of uranium ore does not cause an explosion or release of appreci-

able atomic power because the uranium atoms are so diluted with other atoms around them. The attacking neutrons will spend themselves futilely colliding with unresponsive common atoms.

In hope of getting away from this limitation, attempts are being made to concentrate uranium 235 in very pure form, which is a long and tedious job.

If this can be done, another barrier to too dangerous explosions may exist. Strangely the explosiveness is caused by relatively slow neutrons of low energy. If the neutrons are too powerful, with energies of about 10,000,000 electronvolts, the fission is a dud. A mere capture with release of trivial energy takes place. If an explosion of pure uranium 235 does begin, it may produce enough of the high energy neutrons to bring about these dud reactions and damp out the incipient cataclysm.

In working with uranium, the scientists are like soldiers who know too little about the artillery they are hoping to fire, afraid that it may go off prematurely and fearful that it may not fire at all when they try to pull the trigger.

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