PHYSICS

Atomic Powered Navy

Program for developing propulsion of ships, submarines and aircraft by nuclear energy, with civilian commission, is planned by Navy.

➤ A NAVY powered by atomic energy as well as fighting with atomic weapons is visualized by Rear Admr. Harold G. Bowen, chief of the Navy's Office of Research and Inventions.

A vigorous research program for developing the propulsion of ships, submarines and aircraft by nuclear energy is planned by the Navy under the general guidance of a civilian atomic energy commission.

Admiral Bowen, speaking before the Engineers' Club of Philadelphia, declared:

"The prospects of harnessing atomic energy for the purpose of driving ships in the near future is an amazing possibility."

"If we start with a large vessel," Admr. Bowen said, "we will find that the elimination of the boilers and associated auxiliaries, as well as thousands of tons of fuel oil, offers the possibility of more advantageously disposing of weight. The application of this principle to commercial carriers is obvious. The bottoms of ships can be materially strengthened by using thicker plate, the whole hull structure can be materially strengthened, and armor can be more generally used, all with the idea of making ships less vulnerable to attack by atomic or other forms of bombing.

"Since economy of fuel will no longer be essential, turbines will be completely redesigned, with the whole idea of increasing the amount of horsepower per pound of turbine as much as possible. With resulting greatly increased speeds, there will follow a complete redesign of the underwater body. Marked increases in speed will be conducive to reducing the possibility of effective bombings, etc.

"We will be searching for an ideal coolant for the atomic pile which will be, we hope, fluid from room teperature to 1500 or 2000 degrees Fahrenheit, and not capable of becoming radioactive. The design of the necessary heat exchangers will furnish a fascinating problem to those who are versed in the art of heat exchange."

Admr. Bowen also listed five other problems in atomic energy that are Navy responsibilities:

"The development of nuclear munitions, and the vehicles to launch and carry them;

"The utilization of nuclear studies for the medical sciences;

"The exhaustive exploration of all possible countermeasures to nuclear munitions and their carriers;

"The maintenance of a broad program of research in nuclear physics and the allied fields of science; and

"The education and training of naval personnel in nuclear energy and its applications."

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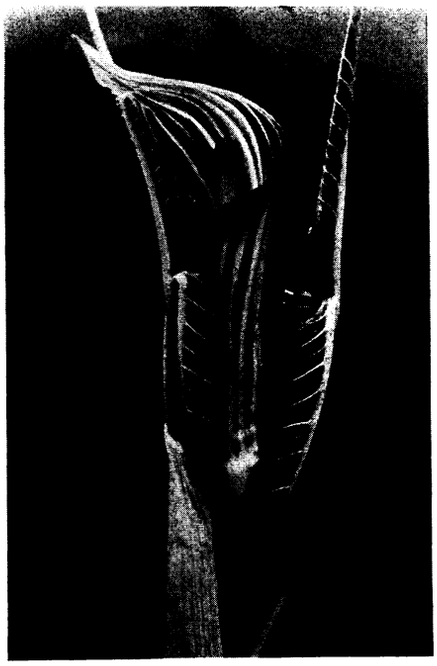

SPRING BANNERS—New leaves are sometimes called by poets "the banners of spring." Here we see the banners unfurling. When Jack-in-the-pulpit prepares to bloom, a tall spike pushes its way up. Within, tightly rolled, are the curious floral structure of this plant and a pair of leaves. Nature photographer Lynwood M. Chase, New Bedford, Mass., has here caught the moment when the flower has partly opened, but the leaves are still close-rolled.

CHEMISTRY

DDT's Future Questioned

War-born "Ersatz", it proved better than insecticides it replaced but may in turn be replaced by other chemically related compounds now made in small quantities.

➤ DDT, now hailed as man's best weapon in the never-ending war against insect pests, isn't here because it was wanted in the first place. It was developed as a wartime "Ersatz" insecticide, to pinch-hit for old favorites like pyrethrum and rotenone when supplies of these were cut off or made inadequate by the war—and it surprised even the scientists who worked with it by being a more effective insect-killer than the ones it replaced.

At the meeting of the National Academy of Sciences, Dr. H. L. Haller of the U. S. Department of Agriculture told the story of DDT up to now, and gave glimpses into its possible future. One quite possible future for DDT may be that it may not have any. That is, Dr. Haller explained, it may be replaced by other chemically related compounds now being made in small quantities and tested, some of which may well prove to be even deadlier to insects than the parent compound, and at the same time less poisonous to larger and more desirable animals that swallow it incidentally or accidentally.

Discovery of DDT's value made life easier for chemical searchers for synthetic insecticides by demonstrating conclusively that to be an effective insecticide a compound does not need to be complex, with big, hard-to-synthesize molecules, like rotenone, pyrethrum and nicotine. Nicotine has been made synthetically, though it still remains cheaper and more practical to extract it from tobacco. Rotenone and pyrethrum have not been synthesized at all, and now it appears unnecessary to attempt the task. DDT has a small, relatively simple molecule, and the new British insect-killer, benzene hexachloride or 666, has a mole-

cule even smaller and simpler in structure.

With successes like these to start on, chemists are making modified molecules of the same general pattern—for example, substituting fluorine for some of the chlorine atoms in DDT, with interesting-looking results in the tests. It may be that we shall have an analogue for the history of the sulfa drugs; at first there was only sulfanilamide, but after a while the sulfa compounds could be counted by the dozens, and from being expected to lick all the bacteria in sight, sulfanilamide presently became assigned to a narrower sector where its work was really effective. Some years hence, the now almost-universal insecticide, DDT, may be only one weapon in the entomologist's armory, with many more of the same general class ready for special missions on the hexapod front.

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ELECTRONICS

Fog Turned to Rain

Siren blasts clear landing fields. Inaudible, high-frequency sound waves, without unpleasant effect of sirens, to be tested.

➤ SOUND WAVES that convert fog into rain may be used instead of wartime flame vaporizing systems to keep future landing fields clear for aircraft, according to officials at the Navy's Landing Aids Experiment Station at Arcata, Calif.

Successfully tested against fog, the first sound system used a battery of sirens whose blasts not only bombarded particles of fog into rain but also nauseated personnel on the airfield.

For the future, a new system to be tested this summer will send out ultrasonic waves that are inaudible to human ears. Transmitting vibrations at 20,000 to 40,000 cycles per second, the equipment is expected to operate as effectively against fog as the sirens but without the unpleasant effects of the latter.

During the war, the British pioneered in FIDO, fog investigation and dispersal operations, and they developed the important Haigill system, that permitted Allied aircraft to land at bases in Britain in severe fogs. The principle used is that of vaporizing the fog by intense heat from controlled fires lining landing strip runways.

Disadvantages of Haigill include the high cost, as much as $4,000 or $5,000 to land one plane with high-octane gas as the fuel for flames. Although this cost was small compared with the lives and equipment saved during the war, intensive research has gone into modifications of the system.

Probably the best thermal installation for clearing fog from airports is the one scheduled for the test at Arcata during the next two months. Known by the code name ELMER, this vaporizer can reduce fuel costs for a landing to as little as $150. ELMER can burn gasoline, kerosene or diesel oil and has an atomizing nozzle with electrical heating elements for igniting it instantly. Haigill systems burned more expensive fuel and required 10 minutes of "warm-up" for effective operation.

While the Navy experimented with ELMER, it also started an investigation of sonic fog clearing. The first tests worked well against the fog but created new problems.

A battery of 12 powerful air raid-type sirens with 24-foot wooden amplifying horns blasted a heavy fog over the experiment station with enough force to merge the fog particles into raindrops that fell to earth, clearing the overcast above the landing field. Personnel on the field had cotton in their ears, with a sponge rubber covering over the outside. They reported no ear trouble, but most of them became nauseated from the intense sound.

The powerful sirens also proved to be more effective than a hunter's horn, as several birds were blasted out of the sky by the noise.

Now, experts at the Navy's Landing Aids Experiment Station believe that the answer is in the use of ultra-sonic transmitters sending out waves at such high frequencies that men and animals won't be able to hear them.

Two problems that sonic engineers hope to answer with full-scale experiments this summer are the possible effects of the sound blasts on personnel in planes and the danger of damaging aircraft by the powerful waves.

If the tests are successful, Navy officers believe that high-frequency sound systems will be more practical than thermal fog dispersal. A sonic system would have approximately the same initial cost as flame installations and could be operated more economically. For Naval use, the sound system may be developed for aircraft carriers. Now being investigated, sonic installations on carriers would enable the big ships to improve their own weather under adverse flying conditions.

A third fog-clearing system tested here used a huge blower to throw curtains of hot air at right angles to the wind. Causing the wind to move in a vertical circle, this wave of hot air consequently dispersed the fog.

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