

GENERAL SCIENCE

Fleet Bombing Obsolete

High-speed guided missiles, prime defensive weapons, now allow relative freedom from fear of atomic bombing by fleets of bombers.

➤ BOMBING by air fleets of the speeds and altitudes of the last war is now obsolete against a fully prepared and alert enemy.

Because of this "logical conclusion," Dr. Vannevar Bush, head of American scientific research and development in the last war, believes that "we have less reason to be terrified by the thought of the A-bomb delivered by fleets of bombers."

Discussing this fear of many people today, Dr. Bush in a book just published, *MODERN ARMS AND FREE MEN* (Simon and Schuster), analyzes the changes caused by the advent of atomic energy applied to warfare.

Delivery of A-bombs by bombers can not be entirely discounted, but he writes that "the specter of great fleets of bombers, destroying great cities at will by atomic bombs is a specter only."

The high-speed guided missile is a prime defensive weapon that promises to neutralize the high-flying bombers. Says Dr. Bush:

"The high-speed guided missile can be used locally, like a gun, or carried to a threatened spot or fired from a plane. It has not the gun's limitations on ceiling and can go as high as the bomber. Its speed of a bullet pretty well guarantees it against being shot down in flight. Jamming is difficult. It is directed into its target and carries a proximity fuze. For defense of restricted areas it promises to be a deciding factor. It can be used air-to-air, but here again the interceptor can use it to better advantage than the bomber."

This guided missile, Dr. Bush indicated, should be ready for war use by the time there are great stocks of atomic bombs.

In his opinion, "it may well render all conventional mass bombing obsolete when two highly technical, alert and industrially advanced combatants clinch."

Despite this new method of defense, Dr. Bush warns that an enemy might with great losses get through to highly important targets. The means of defense is highly expensive and it must be alert, he observes. There are other means of delivery of atomic bombs than dropping them from the air, such as sneaking them into harbors in ships and planting them at the bottom of rivers.

Sneak raids and surprise attacks must be guarded against. The sneak bomber coming in at low altitude to avoid radar warning and too low to be fired upon effectively by batteries of guns and missiles might carry an atomic bomb to a target, even if it were destroyed itself in doing so.

Bombs might be lobbed into coastal cities by rocket projectors perhaps from submarines 25 to 50 miles at sea, Dr. Bush says in his book.

The question of whether germ or biological warfare will be used in the future depends, in Dr. Bush's opinion, upon whether an enemy can deliver the old and the newer toxic materials effectively. He does not believe that mass delivery in an effective method is feasible, and biological weapons are not the absolute weapons, but more important in subversive operations than in open all-out combat.

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LIFESAVING "DOUGHNUTS"—The Sikorsky HO3S-1 helicopter equipped with a utility flotation gear employing carbon dioxide inflation, rides like a boat on the water after an emergency landing. Four inflatable bags, or "doughnuts," two flanking the forward wheel and one each on the two rear wheels, are connected by flexible hose to Kidde carbon dioxide cylinders with special discharge heads in the cockpit. The weight of the flotation gear is less than 150 pounds, and it not only permits take-off from calm or rough water, ice or snow but saves lives and aircraft in forced landings at sea.

NUCLEAR PHYSICS-METEOROLOGY

Industrial Atomic Energy Use Brings New Science

➤ THE development of atomic energy for peacetime industrial uses will make "stack meteorology" an important science of the future.

No:man R. Beers, editor of *NUCLEONICS Magazine*, at the National Air Symposium, Pasadena, Calif., predicted that large atomic energy plants will put in the air materials that are either unusually toxic for chemical reasons or measurably radioactive.

Mr. Beers defined "stack meteorology" as "the entire problem of air pollution from stacks of chimneys as the meteorologist sees it."

The fogging of photographic plates occurred a thousand miles from the first atomic bomb explosion in New Mexico, Mr. Beers recalled. Dust from the great Krakatoa volcano has travelled around the world. Industrial smoke and fumes are likewise carried greater distances than is generally realized.

"Aviators have seen smoke from large cities adequate to dirty their windshields and to decrease visibility up to 300 miles away from the smoke source," he said.

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