AERONAUTICS

B-50 Superfortress Surpasses B-29

➤ A MORE powerful Boeing Superfortress, a counterpart of the famous B-29 but having increased power and improved flight performance, has been announced by officials of the Army Air Technical Service Command. An experimental model has passed flight tests, and the production version is now being built by Boeing Aircraft at Seattle. It will be known as the B-50, Superfortress, or the XB-44.

In addition to the increase in horsepower over the B-29, a new-type nacelle has been designed for the XB-44 which enables a change of engine units to be made by six men in a half hour. It takes six men eight hours to do the same job in the wartime B-29. The new nacelle contains the engine, supercharger, induction system, oil system and propeller controls.

The new superfortress is powered by four R-4360 Pratt and Whitney engines, with a total of 12,000 horsepower. The increase in horsepower over the B-29 comes from the change in the engine installation. The large increase in the available power provides a marked improvement in take-off, rate of climb and speed, Army officials state. A four-bladed Curtiss Electric propeller, which has the reversible pitch feature for braking, replaces the previous propeller.

Science News Letter, March 23, 1946

HERPETOLOGY

Snake Lays Eggs After Four Years of Confinement

➤ SEVERAL EGGS, at least one of which was fertile, were laid by a snake after living almost four and a half years in solitary confinement, states Hampton L. Carson of the department of zoology, Washington University, St. Louis.

An adult female indigo snake five feet eight inches long was purchased by Mr. Carson in January, 1941, and kept completely isolated from all other snakes. Although the snake fed heavily on amphibians, reptiles, birds and mammals, she did not grow perceptibly during captivity.

In May, four years and four months after it came into his possession, the snake laid five eggs. They all appeared normal, with turgid, leathery shells.

The eggs were searched for embryos by cutting circular holes at one end and expelling the yolk of each into a finger bowl. The first two were examined half-heartedly as Mr. Carson really did not expect to find anything. The third, however, revealed a small embryo about a fifth of an inch long. The embryo seemed normal in every way. No embryos were found in the two remaining eggs.

This is probably an extreme case of delayed fertilization, the sperm having been stored in the genital tract of the female for at least four years and four months, Mr. Carson states. The conditions under which the snake was kept during the spring of 1945 differ in no way from those of the four previous springs and there is no obvious explanation of the failure of the snake to lay eggs during the first four years of captivity.

Several other cases of sperm storage by female snakes have been reported during the last decade or two, and Mr. Carson suggests in a report to the American Society of Ichthyologists and Herpetologists that this phenomenon may exist widely in snakes.

Some species which do not have gregarious habits, for instance, should benefit particularly from the capacity to store sperm. The three snakes known to store sperm are all warm-climate species that lack the gregarious habits of hibernation characteristics of certain northern snakes and thus have less chance of finding a mate each year.

Science News Letter, March 23, 1946

ORDNANCE

Rate of Fire Speeded Up In .50-Caliber Machine Gun

➤ THE .50-CALIBER machine gun, chief reliance of American flyers in their air fights during the recent war, has had its rate of fire stepped up by 50%, it is disclosed by Col. René R. Studler. (*Army Ordnance,* Mar.-April.)

The improved weapon can reach a rate of 1,250 rounds a minute, as compared with a maximum of 850 for the wartime model. Of course, no machine gun is fired continuously for as much as a minute. But if all 14 forward-bearing guns on a B-25 were to be fired in a combined, one-second burst, they would hurl 280 two-ounce slugs at the enemy during that short period, Col. Studler points out.

The new piece is only one and one-half pounds heavier than its predecessor. Improved metals and at least 10 distinct technical improvements account for its radically heightened performance.

Science News Letter, March 23, 1946

IN SCIEN

CHEMISTRY

New Method to Take Pure Oxygen from Air

➤ PURE OXYGEN can be obtained from the air by a relatively simple process developed during the war that uses synthetic chemicals and works on the same principle by which the blood in the human body takes oxygen from the air in the lungs and transports it to the tissues. The new method was explained recently at a meeting of the California Section of the American Chemical Society by Dr. Melvin Calvin of the University of California.

It was observation of this human process and similar natural processes, according to Dr. Calvin, that enabled scientists to evolve the new synthetic method of oxygen preparation, which, he said, was first used in the South Pacific to produce oxygen needed for welding and other repair work away from regular repair bases.

The process employs an entirely new group of chemicals which belong to a class of compounds called chelates. These are made up of metal atoms attached to organic molecules, he explained, the latter usually composed of carbon, hydrogen, nitrogen and oxygen. Nature has long utilized chemicals of this type for the essential use and generation of oxygen by animals and plants, such as the green chlorophyll of plants and the hematin that gives the red color to blood, he said.

In the new process, one of these chemicals, in the form of red crystalline granules, is placed in a tube and a stream of air is blown through it, he explained. "As the red granules absorb the oxygen, they turn black and begin to get warm. As they warm up, the rate of oxygen absorption decreases and the total amount of oxygen which they can absorb is decreased, therefore, the tube is cooled by a stream of water around the outside."

After the crystals have absorbed all the oxygen they can, the stream of air is stopped and the cold water surrounding the tube is replaced with hot water or steam, he continued. As the crystals are warmed, they give off the oxygen and again become red. The oxygen may be collected in a storage tank, and the crystals may be reused thousands of times.

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CE FIELDS

PHYSIOLOGY

Drugs That Fluoresce Traced Through the Body

➤ DRUGS that fluoresce, or shine with a glow of their own under invisible ultraviolet radiation, can be traced by this means in their course through the body, Dr. Charles H. Taft of the University of Texas Medical Branch states. (*Science,* Mar. 15)

Dr. Taft chose a quinine derivative, quitenine, because of its intensely purple fluorescence. He injected it under the skin of a considerable number of toadfish, and each day killed and dissected a fish, exposing its internal organs to ultraviolet radiation. He found that the drug, at first rather generally distributed throughout the body, presently concentrated most strongly in the liver, and to some extent also in the kidneys.

Dr. Taft states that he is continuing his work on the use of ultraviolet rays as a physiological tracer method.

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CHEMISTRY

Protection from A-Bomb Radiations Suggested

➤ GLASS to protect against deadly radiations from exploded atomic bombs was suggested at a section meeting of the American Chemical Society in Detroit, by Prof. Alexander Silverman, head of the chemistry department of the University of Pittsburgh. The glass recommended is not the ordinary kind, but has a high lead and uranium content, and would be suitable for lining shelters.

"Strange as it may seem," he said, "uranium, which is used indirectly in atomic bomb manufacture, produces a glass which is probably the best protection we have against powerful X-rays and other harmful radiations. In post-bombing rescue work, uranium or lead spun-glass garments and helmets lined with these glasses in plate form will permit safe entry into the bombed area. Oxygen respirators will be equipped with glass-insulated high-frequency precipitators to keep radioactive dust out of the lungs of the rescue squads."

Prof. Silverman called attention to many new types of glass, and many new uses for them. Optical glass researches, he said, have yielded new products to transmit or absorb radiation of all kinds, noting that reflection and transmission controls make it possible for binoculars to transmit 60% more light than they did before the war. He also mentioned a new treatment for mirrors that permits a person to see himself in the reflecting surface and at the same time makes him visible through the glass to a person behind the mirror.

Fiber glass and foam glass will have wider uses in the future, Prof. Silverman indicated. "The heat-insulating value of the former will be utilized more extensively than ever in outdoor clothing and automobile and other vehicle insulation. The reinforcing strength of glass fibers will serve in a host of postwar plastic articles," he declared.

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AERONAUTICS-ENGINEERING

Heating and Ventilating Problems Face Aviation

➤ HEATING and ventilating passenger airliners, particularly those designed for operation at 15,000 feet and over, is a problem on which aviation engineers are now concentrating because of anticipated increased travel by air and the use of high-altitude airlanes.

Development has already reached a point astonishing to the land engineer, B. M. Brod, of American Airlines, told a meeting of the American Society of Heating and Ventilating Engineers in New York, but, he said "the end is not yet, for pressurizing of cabins has raised many problems, some of which are not even as yet recognized."

Heating systems for air transports flying at 15,000-foot altitudes are designed for an outside temperature of 40 degrees below zero, he said. Operation at 20,000 feet, anticipated shortly, will require a design temperature of 60 degrees below zero. Loss of cabin heat is large because of the thin walls.

Three types of heating systems were described by Mr. Brod. One is the steam system, in which heat from the exhaust is used in a flash-steam boiler; the second makes use of exhaust heat in a heat exchanger in the ventilating air stream; the third is a gasoline-burning heater.

The first system, he stated, is safe but heavy, and requires excessive maintenance; the second is simple and reliable but needs frequent checking; and the third is efficient, light and flexible, but has short life, high maintenance, and requires piping of gasoline to the heater.

Science News Letter, March 23, 1946

ENGINEERING

Gas Turbine Engines May Power Ocean Liners

➤ GIANT GAS TURBINE engines may soon be used to power ocean liners and war vessels, following their present successful use in the propulsion of airplanes. They may also be used in locomotives and in central power stations. These predictions were made by John R. Carlson, Westinghouse engineer, at a meeting of the Washington branch of the Society of Automotive Engineers.

Before gas turbines can be used in vessels, a reversible-pitch propeller will have to be perfected to facilitate moving a ship forward and backward, he stated:

"Ships now propelled by steam turbines don't need this type of propeller because they are equipped with a reversing element for running astern. In forward operation, this reverse element, which is mounted on the same shaft as that which propels the ship forward, spins backward while idling. It doesn't absorb much power while rotating because that section turns in a vacuum."

"But the gas turbine," he said, "can't be built in such a way that its reverse element will turn in a vacuum, but must revolve in air of approximately atmospheric density, and thus sets up turbulence and resistance resulting in greater fuel consumption and higher operating costs. There is every reason to believe, however, that this problem will in time be solved."

Chief advantages of the gas turbine, Mr. Carlson stated, lie in its simplicity of design and operation, its compactness and relatively light weight. Progress in its development was delayed for a long time, he added, by the fact that there were no metals known that would withstand the combination of high temperature and tremendous mechanical forces necessary for such turbines to operate at high efficiency. Wartime-developed alloys now meet this requirement, and the way is cleared for greater advancement along other lines.

"Widespread use of the gas turbine as a central station power plant is foreseen only when the higher thermal efficiency at higher temperatures of which it is capable, as compared with that of a steam turbine, justifies the added fuel cost," he continued. "At temperatures above about 1,000 degrees, steam turbines rapidly fall off in efficiency, but gas turbines continue to increase in efficiency as operating temperatures rise."

Science News Letter, March 23, 1946