

pounds, fatigue durability goes up from 5,960 stress cycles to more than 5,000,000. When a nut is tightened against reasonably rigid abutments to produce in the bolt a tension equal to or greater than

the working tension load, the speaker stated, practically no stress change takes place and the bolt's operating strength approaches its static strength.

*Science News Letter, February 5, 1944*

## AERONAUTICS

## Indium Used on Planes

**Rare metal adds life to aircraft engine bearings and propeller blades. Coatings of zinc-indium combination eliminate need of greasing surfaces.**

► **INDIUM**, one of the rarer and less known metals, is contributing to the war effort by increasing the service life of airplane bearings and propellers. Known to chemists for 80 years, indium has been used commercially for only the past 15 years or so. A small amount of it added to nonferrous metals gives them greater tensile strength, increased hardness and resistance to wear, friction, abrasion and corrosion.

The search for a source of indium in the United States, beginning early in the twenties, its successful location in connection with zinc ores, and its separation and purification, were discussed at the New York meeting of the Institute of the Aeronautical Sciences by William S. Murray, president of the Indium Corporation of America. Prior to the search its values in stabilizing nonferrous metals had been proven.

"The aviation industry," he stated, "was the first industry to recognize the value of indium-treated bearings."

These are mostly a silver-lead-indium alloy. The same bearing material is used in automotive and stationary engines. Aviation engine bearings with indium-diffused surfaces can be oversped and over-loaded without fear. "Because of relatively high oil temperatures, because of the generation of acid in the oil and because of heavy loads and the necessity of having a surface of high wettability, indium is of prime importance and has contributed vitally to the efficiency of your power plants," the speaker continued.

Coatings of a zinc-indium combination have proved satisfactory in laboratory and service tests for airplane propeller steel blades, to protect them from corrosion and wear. The coatings adhere firmly to the steel, and do not chip or peel. Use of indium eliminates the need of greasing or oiling the blade surfaces.

Some half-million ounces of indium

are now available annually in the United States. Most of it is produced as a by-product of zinc and lead operations. It is a silvery white metal, softer than lead, both malleable and ductile. It is used as a dental alloy and in silverware to harden the silver and give it greater surface stability.

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### Fire Hazards Decreased

► **FIRE HAZARDS** in aircraft will be greatly lessened in the future by the use of proper materials connected with engine installations, automatic fire-detection devices, and semi-automatic fire-extinguishing apparatus, predicted Harvey L. Hansberry of the U. S. Civil Aeronautics Administration at the meeting of the Institute of the Aeronautical Sciences.

Studies to determine fire-resistant engine installations in future aircraft, and to develop fire-extinguishing systems for use in aircraft already in service, have been under way for the past four years by this government agency. In its studies and tests four basic investigations were made concerning fire resistance of materials, fire sources, fire detection, and fire extinguishment, Mr. Hansberry said.

The material tests, he stated, "have proved the superiority of steel over aluminum alloy in and around the engine installation." Fire-detection apparatus should warn the pilot within three seconds of the ignition of a fire. They should be located in all areas through which flame might pass regardless of the location of the fire source.

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### Stall-Warning Devices

► **NEW** stall-warning devices, now perfected, for use on private flying planes

probably will greatly lessen the number of fatal accidents. This is the opinion of James George of the Civil Aeronautics Administration, expressed at the meeting of the Institute of the Aeronautical Sciences, where he announced the development of two new reliable stall-warning devices by the office he represents in cooperation with several industrial and college research laboratories.

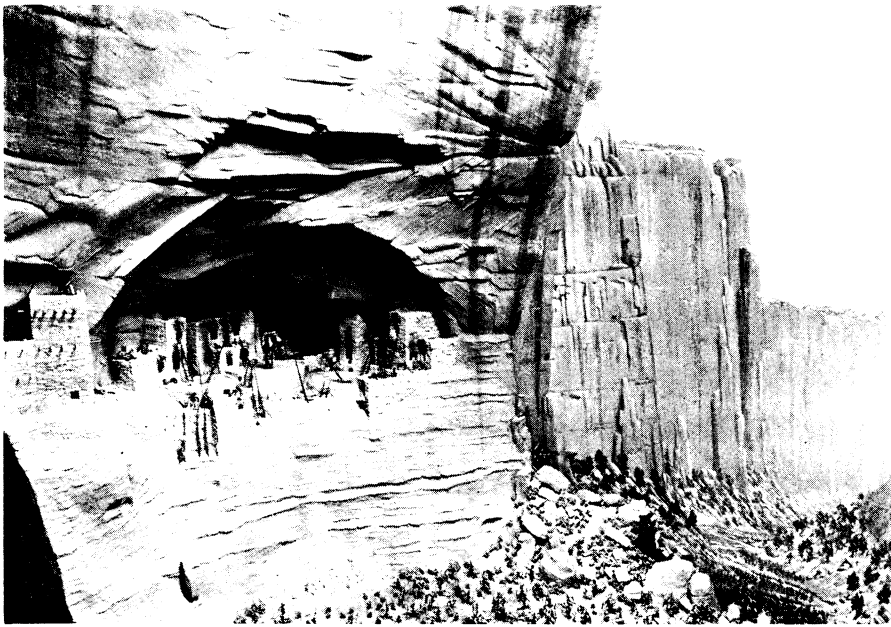
More than half the fatal private flying accidents are caused by stalls, with a death toll exceeding 100 a year, he stated. The new devices will warn pilots of approaching stalls so that they may take the necessary steps to prevent crashing. The devices will be low-cost, dependable, light in weight, and easily installed in existing planes. They will be available commercially in the near future.

Stalling of planes in the air occurs when they lose flying speed. Until the speed is regained a plane is unable to sustain itself in level flight and begins to fall.

A plane may stall when loss of power causes loss of speed. It may stall when the angle of attack of the plane is so increased that the airflow over the wings and body leaves the upper surface, and forms a turbulent wake or eddy toward



**GIANT "SPARK PLUG"**—This 14-foot condenser bushing is part of a huge automatic switch that will guard flow of electric power into a new Westinghouse war plant. The bushing conducts 230,000 volts of power into the tank on which the workman is standing, just as a spark plug in your automobile conducts electricity into the gas-filled cylinder.



**MUMMY-CAVE VILLAGE**—This is a model showing in miniature a cliff-dwelling as built in a cavern of Canyon del Muerto, Arizona, which was occupied about 1250 A.D. The Indians abandoned the cave about 50 years later because of drought and a military defeat, archaeological evidence indicates. This diorama is in the new Hall of Indian America at the Chicago Natural History Museum. (See also page 83)

the rear. Flying speed is recovered by nosing down and diving.

In the two new devices now ready, the pilot is warned of approaching stall by the sounding of a horn and the flashing of a light, Mr. George stated. These signals are actuated in one model when the airplane reaches a certain angle and the airflow is reversed, causing the turbulent wake. This forces a vane which projects from the leading edge of the wing to move upward, closing a switch.

The other model is operated when pressure reversal sucks a diaphragm up-

ward and forces an attached metal plate against electrical contacts. It has a cut-out button which can be used during take-offs and landings.

The development work on one model was carried out in Pittsburgh by Westinghouse Electric & Manufacturing Company, together with the Carnegie Institute of Technology; the other in Troy, N. Y., by the W. & L. E. Gurley Company and Rensselaer Polytechnic Institute. Scientists of other institutions assisted.

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#### MEDICINE

## Typhus Vaccine Reliable

► THE AMERICAN-MADE vaccine on which the United States and Britain are relying to protect their troops from typhus fever is at least as good as any other such vaccine, including those available to the Nazis.

This conclusion, based on a report from Germany of a "crucial experiment" by Dr. Erwin Ding, who describes himself as a storm troop leader, is drawn by the editor of the *Lancet* (Dec. 18, 1943) British medical journal.

The storm troopers must have suf-

fered heavily from typhus fever, the *Lancet* editorial also suggests. Evidence for this is seen from the figures and other details in Dr. Ding's report.

He vaccinated six groups of persons with one or another of six types of typhus fever vaccine and left two other groups unvaccinated as controls. Although his results are given only in percentages, without stating how many persons were in each group, such figures as 0.5% complications suggest a number of the order of 200 in at least one group

and show that several hundreds were involved altogether.

The vaccine used for American and British troops is made from the yolk sacs of infected developing eggs. The method was developed by an American scientist, Dr. Herald R. Cox, while on the staff of the National Institute of Health of the U. S. Public Health Service.

The difficult-to-make and costly Weigl vaccine from the intestines of infected lice; vaccines from lung suspensions from infected rabbits and dogs; and weaker preparations of egg yolk vaccine than the Cox vaccine, made in Marburg, Germany, as well as a Cox vaccine made in Germany, were those tested by the storm troop leader.

The weaker egg vaccines and a dog lung vaccine made in Rumania were less effective than the others. No deaths occurred in any vaccinated group except those receiving the Marburg vaccine. Deaths in the unvaccinated control groups ran to 20% and 33%.

The number of cases of typhus developing in the groups was unaffected by vaccination, but the severity of the disease was much less in the vaccinated.

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#### NUTRITION

## Vegetables Prevented From Loss of Color

► DEHYDRATED vegetables and fruits are protected against loss of quality through the unwanted action of the life-agents, or enzymes, of their own cells during processing by a new method on which U.S. patent No. 2,340,170 has just been issued to John M. Baer of Chicago.

Certain plant enzymes promote oxidation. This is necessary while the plant is alive and growing, but if the enzymes continue their action after the vegetables or fruits have been peeled and sliced for dehydration they produce a dark coloration in such things as potatoes, peaches and apples, which reduces their market value. Heat destroys enzymes, so if the foods are pre-cooked before dehydration this trouble does not arise; but it is not always desirable to market the products in a cooked condition.

In Mr. Baer's process, the prepared vegetables or fruits are placed in a closed chamber and the air is rapidly pumped out, to a high degree of vacuum. Then they are quickly heated, though not to the cooking point, and the temperature maintained for only a couple of minutes. After that the temperature is reduced,