



**VITAL MINERALS**—Needed for radio tubes, condensers and airplane spark plugs, the present supply of mica (left) is insufficient. Scheelite from which tungsten is made shines (right) under fluorescent light.

calcium, and has been used for many years in the manufacture of steel, four to six pounds being required as a flux in the production of each ton of open hearth steel. It is also used in the preparation of artificial cryolite, which is essential in making aluminum.

Natural cryolite is found only in Greenland, and during the height of the U-boat campaign our aluminum production would have been seriously curtailed if we had not been able to replace it with the artificial substance made from fluor-spar. This use and the increased need for steel resulted in a serious shortage of fluor-spar. Extensive investigations by the Survey led to the discovery of new ore bodies which insure an adequate supply of this war-mineral.

#### Rich Deposits

The most important fluor-spar-producing region in the world lies in a small area that stretches from northwestern Kentucky across the Ohio River to southeastern Illinois. Intensive studies made by the Survey revealed many previously unknown deposits in this region, and drilling by mining companies and by the Bureau of Mines has paid off in important new supplies.

Actual and possible fluor-spar-bearing deposits are also being studied by the Survey in Colorado, New Mexico, Utah, Nevada, Texas and other western states. Commercial quantities of the mineral have also been found in the east, particularly in New Hampshire and Tennessee.

Field parties have investigated beryl deposits scattered throughout Argentina, South Dakota, Colorado and Maine. Beryl is the source of the important alloy metal, beryllium. This metal is used in the production of tough copper alloys for calibrated springs in instruments of all kinds where permanence of the spring is vital, in electrical equipment and in safety tools to reduce the spark hazard where dangerous gases or liquids are present.

#### Search for Manganese

In many southern and western states, and in Cuba, Brazil and Chile the successful search continues for deposits of manganese, a metal absolutely necessary in the production of sound steel.

Deposits of tantalum recently discovered in New Mexico comprise the largest known source in the United States. This rare metal is needed now for radio tubes, steel cutting tools, wear-resistant parts of machines, portable radio transmitters, surgical foil and secret war uses. Although tantalum ore has been mined in small quantities in Wyoming, South Dakota and New Mexico, the principal source is abroad. The New Mexico deposits, if they meet expectations, will serve to supplement the meager sources available during the war.

To fill the needs of a nation at war, scientists are seeking more magnesium, which is lighter and stronger than aluminum, to make airplanes. They're also after molybdenum, antimony, mercury,

copper, zinc, iron, indium, industrial diamonds, vanadium and a dozen other metals that go into the tools of war. In Alaska they are prospecting for chromium, coal, iron, mercury, tin, tungsten and zinc-lead.

As the needs of basic minerals for war change, so does the direction of the search. For it is the task of the scientists to keep war production plants supplied with materials for weapons of victory.

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#### PHYSICS

### Rubber Engine Mounting Cuts Vibration in Bombers

➤ A NEW rubber mounting for engines of big bombers, like the Flying Fortresses, reduces vibration from the engines to a minimum. The new mounting makes the operation of the bomber smoother, decreases the strain on structural parts of the plane, lessens the nervous fatigue of pilots and crew, and increases the accuracy of precision instruments, resulting in more accurate bombing and gunfire.

The new mounting, developed under the direction of Dr. S. D. Gehman of the Goodyear Tire & Rubber Company, absorbs vibrations from the powerful radial engines, so that when the engine vibrates, the rest of the plane does not vibrate at the same time.

The mounts are used to attach the 1,200 horsepower engines to the tubular mounting ring which is welded into the plane structure. Each mount consists of two main parts. There is a collar, lined with a rubber bushing attached to the mounting ring with lugs. This collar has a socket in it, which is at right angles to the collar itself. The other half of the mounting, attached to the engine, ends in a ball which fits into this socket.

Vibrations developing in the engine are isolated by the ball-and-socket joint and by the rubber bushing in the collar. The ball-and-socket produces a unique rocking motion, so that the engine has a freedom of motion for every type of vibration that may occur.

While the new mounting is now used only on the Flying Fortress, it can be applied to all types of planes. It is expected that this rubber mounting will contribute greatly to the comfort of flying in post-war luxury airliners.

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Nitrogen fertilizer applied to apple trees in *foliage sprays* is supplementing time-honored methods of soil application of the urea fertilizer.