

## ENGINEERING

**Steel "Parallelograms" Form Giant Sphere**

➤ TWENTY steel "parallelograms" were fitted together like a global jigsaw puzzle to build the giant sphere in use by the U. S. Navy at Carderock, Md., in connection with a wind tunnel. Former pieces used in building oil, gas and other spherical tanks were fabricated of "orange peel" sections.

This radical new method of shaping steel pieces to fit together into a sphere is the work of scientists at Mellon Institute, working under the auspices of the Pittsburgh-Des Moines Steel Company. It saves both labor and cost in rounded steel construction.

In the process employed, a small plastic sphere was molded in a wooden form. This was then cut into parallelograms, four-sided geometric figures with parallel sides but not necessarily of equal angles. These cutout sections were flattened by a heat lamp. They then became a "dressmaker's pattern" for economically tracing on flat steel the exact design to cover a sphere.

In constructing the 32-foot vacuum tank at Carderock, known as an Icosasphere, thousands of dollars were saved by this new layout method, it is claimed. It was erected by the Pittsburgh-Des Moines Steel Company. The Icosasphere is the invention of J. O. Jackson of that company.

The giant sphere was erected in half the time anticipated for a globe of its size. It reduced the usual welding requirements by one-third, and cut in half the amount of steel usually wasted in scrap. This same method may be applied in cutting steel sections for submarine and steamship hulls, rockets, domes and other double-rounded bodies.

Science News Letter, January 28, 1950

## FOOD

**Harmful Effects of Chemicals Investigated**

➤ THE poisonous or harmful effects of over 125 chemical compounds sprayed on fruits and vegetables are being scrutinized by a long stream of technical experts at Food and Drug Administration hearings in Washington, D. C.

The compounds include DDT, 2,4-D, lindane, parathion, and all the other insecticides, herbicides, and fungicides developed since the beginning of the war.

Farmer, government, and manufacturing groups will all present their views on the effects on humans of these insect- and weed-killing poisons. The hearing is considered to be one of the most thoroughgoing efforts ever made to safeguard the nation's health.

Not since the protracted hearings on lead arsenate—DDT's predecessor—a generation and more ago, has there been such

a large-scale attempt to insure the public against harmful quantities of the bug-killing poisons.

The hearings will last, according to various estimates, from two to four months, although some observers predict they will drag on for a year or even more.

The first witness was the Department of Agriculture. The principal argument stressed was the necessity for using poisonous compounds in order to keep down the insects and other pests, so that the needed food can be raised in the required quantities.

All interested forces in the multi-billion dollar fruit and vegetable industry will have an opportunity to testify. Chemical manufacturers, farmers, federal and state agricultural scientists will weigh the relative merits and dangers.

The final upshot of the hearings, which will sift every phase of the matter from how much spray is used to ways of washing it off before the produce is sold, will be a set of rules which will govern the permissible residues on fruit and vegetables transported in interstate commerce.

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## ENGINEERING

**Mercury Vapor and Steam Power Turbines, Save Fuel**

➤ MERCURY vapor and steam will power turbines in a new electric plant built to increase the amount of electricity available to the State of New Hampshire. Steam turbine engines are common; mercury vapor turbines less known. In this case the two are combined to provide an economical fuel-saving plant.

The new station, opened by the Public Service Company of New Hampshire, is equipped with two 7,500-kilowatt mercury-turbine generators and a 25,000-kilowatt steam turbine generator. Steam for the latter comes from the mercury vapor which has done its work in turning the shafts of the mercury turbines.

In operation liquid mercury is vaporized by heat from boiler furnaces and the vapor is used to drive the two mercury-turbines, acting in about the same way as in other gas turbine engines. After the mercury vapor has passed through the turbines, it is piped into condenser-boilers where it gives off enough latent heat in its conversion from a gaseous to a liquid condition to turn water into steam. This steam drives the steam turbine.

Heat for the mercury boiler furnaces can be supplied by the burning of either pulverized coal or by the lowest commercial grade of fuel oil. The equipment will be able to produce more electricity with a given amount of fuel than any generating equipment of comparable size yet built, it is claimed. The mercury vapor and steam driven turbine generators were built by General Electric.

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**IN SCIENCE**

## ENGINEERING

**New Phonograph Needle Plays Any Speed Records**

➤ A NEW phonograph needle, which will be "in the groove" on all kinds and speeds of records will shortly be on the market.

The new needle can be used on any kind of commercial record now made. It takes advantage of the fact that the sound can be picked up from the sides of the grooves and the needle does not have to be right down in the bottom.

Invented by John D. Reid of the Avco Manufacturing Corporation, Cincinnati, Ohio, the needle is being manufactured by the Vallords Jewel Company, Lancaster, Pa. The work was reported in JOURNAL OF ACOUSTICAL SOCIETY OF AMERICA (Nov. 1949).

Record-producing companies have not standardized the depth or width of their grooves, nor the angle at which they are cut.

On a machine that would play all three speeds of records, it was sometimes necessary to change the needle every time the speed was changed.

The needle has a blunt tip, one so blunt that its angle is greater than the angle of any groove now being made. While it hits the sides of all grooves, it never touches bottom in any groove.

In various kinds of grooves different parts of the surface of the needle come in contact with the record. This results in less wear. Since a fine point is not needed, there is no danger of breaking the tip.

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## PHYSICS

**Atom's Energy May Be Measured More Accurately**

➤ MORE accurate measurement of the energy inside an atom can be made as a result of experiments with the cyclotron at the University of California in Los Angeles, Calif.

John Teasdale, graduate student in physics at U. C. L. A., has worked out a method of determining how much energy a proton loses as it shoots through varying thicknesses of different metals. Since many instruments used in nuclear studies require metal foils, it is important to know the energy loss to the proton as it passes through the metal.

Mr. Teasdale's method is to vary the thickness of two stacks of metal foils until each produces the same energy loss when inserted into the proton beams.

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# E FIELDS

## ENGINEERING

### Transmitter-Receiver To Help Save Ditched Pilots

► A TINY radio transmitter-receiver, for use by ditched airplane pilots in lifeboats or lifebelts in the ocean, is small enough to hold in one hand and is powered with a miniature battery carried in a pocket. It is a development of the U. S. Air Force at Wright-Patterson Base, Dayton, Ohio.

This small, lightweight radio lifesaver is designed to replace the 40-pound set used during the war, known as the "Gibson Girl." It has now been thoroughly tested and will soon become standard equipment for all Air Force pilots and airmen. Tests show that its signals have a pick-up range of 80 miles, and that it is little affected by temperature changes.

The device operates on two channels, very high frequency and ultra high-frequency, and can be switched from one to the other instantaneously. It is able to transmit and receive both voice and code signals. Its miniature, mercury-type battery will not deteriorate with lack of use or with age. The entire unit is completely impervious to salt water.

The new equipment is already in production in Los Angeles by the Hoffman Radio Corporation. Engineers of this company collaborated with the Air Force in its development.

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## SEISMOLOGY

### Discrepancy in Speed of Shock Waves Explained

► A NEW theory of the structure of the earth's crust which may explain away a discrepancy that has puzzled earthquake experts, has recently been suggested by Prof. Beno Gutenberg of the California Institute of Technology.

The discrepancy crops up in an apparent difference of speed between shock waves from artificial explosions and those set off by natural earth tremors.

After setting off artificial explosions and carefully comparing wave velocities with earthquake readings, Prof. Gutenberg has come to the tentative conclusion that about nine miles (15 kilometers) beneath the earth's surface there is a layer of rock which slows down the speed of shock waves. Present theory holds that wave velocity increases with depth.

On the basis of limited experiments so far, Prof. Gutenberg finds that his hypothesis seems to eliminate the velocity spread between natural and artificial shocks.

The exact significance of the new theory

is not yet clear since it will require more detailed comparisons to see if it fits all cases. It suggests that there may be a layer of rock of a still undetermined nature which causes the waves to slow down.

The slow speed layer would act in such a way, Prof. Gutenberg says, that its existence could not be detected by refracted waves from artificial explosions.

When asked if the new theory would change our ideas of structure of the earth, one of Prof. Gutenberg's colleagues said, "No, it will not, for the simple reason that what we know about the structure of the earth is next to nothing."

Prof. Gutenberg announced his theory in the journal, *SCIENCE* (Jan. 13).

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## MINING-INDUSTRY

### New Mexico Coking Coal To Aid Western Industry

► COKING coal, recently discovered in New Mexico, can easily be made available for western industries, the U. S. Geological Survey revealed. It is an important discovery because little coal suitable for making coke is found in the West.

In a recent survey of New Mexico by the government office, the state is found to have more than 60,000,000,000 tons of coal, some suitable for coking. Included are 50,000,000,000 tons of sub-bituminous coal in beds more than 30 inches thick, and nearly 11,000,000,000 tons of bituminous and small amounts of anthracite in beds more than 14 inches thick. All are less than 3,000 feet from the surface.

A preliminary table showing the summary results of the survey is available without cost from the Geological Survey. The title is "Estimated Original Coal Reserves in New Mexico."

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## MEDICINE

### Diphtheria Germs Contain Protein-Building Chemical

► DISCOVERY, in diphtheria germs, of a hitherto unknown protein-building chemical is announced by Dr. Elizabeth Work of University College Hospital Medical School in London.

The chemical is an amino acid. Its name is diaminopimelic acid. Its properties correspond closely, Dr. Work reports, to a diaminopimelic acid that was made synthetically in 1908, but this is the first time it has been discovered in nature. Dr. Work thinks many other bacteria besides the diphtheria germ may have this acid in them. In the diphtheria germ, it is probably a constituent of the germ's protein. Dr. Work reported her discovery in the journal, *NATURE* (Jan. 14).

Science News Letter, January 28, 1950

## CONSERVATION

### Hybrid Pines Promise To Replenish Forests

► A PREDICTION that fast-growing hybrid pine trees will do as much for America's depleted forests as hybrid corn has done for the American farmer was made by Victor H. Schoffelmayer, agricultural consultant of the Southwest Research Institute and president of the Texas Chemurgic Council.

Seedlings of hybrid pine, product of 20 years' research, will outgrow the parent tree "by 100 to 300 percent in height and more than that in volume in a given time," he told the winter meeting of the Southern Association of Science and Industry.

Waiting for nature to reforest burnt-out or cut-over areas will not do the job, he said. Man must step in with his scientific knowledge of plants and his methods of reseedling which are quicker and more efficient than nature's way, he said.

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## ENGINEERING

### New Construction Method Claimed to Cut Costs

► A NEW method of construction using reinforced concrete slabs, to be employed in erecting an administration building at Trinity University, San Antonio, Texas, will save about 10% in costs over older conventional methods.

Construction bids already received from contractors indicate this saving. The new method is called the Youtz-Slick process after its originators, Philip N. Youtz, New York architect, and Tom Slick, a San Antonio business man. Development of the method was carried out at the Institute of Inventive Research, San Antonio, Texas.

The secret of the saving comes from the use of the floor slab for a casting form. This eliminates the necessity of erecting conventional forms for each floor. When poured and cured, the upper floors are raised to position by special machinery.

As described by William J. Lance, of the Institute staff, "foundations are poured in place and followed by the pouring of a base slab. Columns of pipe, structural steel or concrete are then placed, anchored and grouted. The roof slab, or the second floor and roof slabs if the building is two-story, is laid on the base slab which is used as a bottom form, thereby requiring only edge forms.

"Concrete is then poured directly on the base slab over a separating medium and allowed to cure for at least seven days. Specially designed lifting equipment is placed on the columns and attached to the slab. The slab is then raised to its permanent position and welded to the column by means of a collar which was placed in the slab at the time of pouring."

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