

## ENGINEERING

# New Steel-Making Process

► JETS of air, directed across the surface of white-hot liquid pig iron, feature a new steel-making process which gives a product of open hearth quality, low in phosphorus and nitrogen, revealed in Pittsburgh, by the Carnegie-Illinois and the Jones and Laughlin steel corporations which collaborated in its development.

Credit was also given by these companies to C. E. Sims, of Battelle Memorial Institute, Columbus, Ohio, who assisted with research proposals. The metallurgical feasibility of the new process has been demonstrated by the results of preliminary tests using small-scale units. A full-size furnace in which operating problems can be studied experimentally is to be erected.

The vessel in which the process is carried out is a "turbo-hearth." The turbo-hearth was developed in an attempt to combine the advantages of the basic open hearth and acid Bessemer processes, the leading methods now followed by steel-makers in the United States. Turbo-hearth steel is made in a partly closed, side-blown vessel, lined with refractory material similar to that used in the Thomas basic Bessemer process.

The brick lining is magnesia rather than silica. As in the Bessemer process generally,

heat is supplied by chemical action of the blown air with carbon and other elements of the charge. Chemical action is fast and direct, but subject to controlled conditions which reduce the nitrogen and phosphorus contents, making turbo-hearth steel comparable to open hearth steel, hence suitable for more general use than the customary Bessemer steel.

The high-silicon iron used in the Bessemer converter and the high-phosphorus iron in the Thomas operation are required largely because carbon, the predominating heat-producing element in the charge, is not completely utilized. Combustion of the carbon proceeds only to the carbon monoxide stage, so that two-thirds of the potential heat from the combustion of carbon is lost when the carbon monoxide burns to carbon dioxide in the air outside the vessel.

Conservation of this heat has been accomplished in some cases by the introduction of air at the side or on the surface of the converter charge in sufficient quantities to cause complete burning inside the vessel. This suggested the new development, one in which jets of air are directed on the surface of the liquid iron, providing extra heat for more complete combustion.

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Such installations cannot be built in just any kind of rock formation, he pointed out. Consideration must be given to inherent weaknesses in the rock, possible active stresses, ground water level and water supply requirements.

He feels any relocation of industry underground would be only a small percent of a nation's national production. The idea of great cavernous areas underground does not agree with geological engineering facts. Such structures would have to be based on the same principles as mines or caves; greater the space, greater the stress from overloading.

If a bomb was dropped on an overloaded area, it might be a second stress which might cause cave-in.

Mr. Kiersch stressed that there are many types of rocks with different strengths and other variable factors. Simply going a certain depth underground does not give protection. Some existing mines, caves might be useful, but only if they meet certain scientific specifications, many of which still have to be worked out.

Science News Letter, April 30, 1949

## GEOLOGY

## "Earthquake Weather" and Moon May Set Off Tremors

► "EARTHQUAKE weather" and even the influence of the moon might be studied by scientists trying to learn more about quakes such as the one which rocked the Northwest April 13.

These suggestions were made at a meeting of earthquake scientists in Berkeley, Calif., by Prof. G. E. Goodspeed, head of the department of geology at the University of Washington. Dr. Goodspeed missed the Seattle earthquake because he was on his way to this meeting of the Seismological Society of America.

He explained that "earthquake weather" which often occurs in California comes when a low pressure area moves in, lowering the barometric pressure. This makes a difference of thousands of pounds of pressure per square foot. It might be "the straw that breaks the camel's back" in setting off a quake, he suggested.

Eclipse of the moon April 12, hours before the tremor, points up the need for considering any possible relationship between the moon and earthquakes, Dr. Goodspeed contended.

Geologic cause of the Northwest's quake, however, was a fault in the earth east and parallel to the Olympic Mountains, the University of Washington geologist said.

The fault, tens of millions of years old, lies 1,000 feet below glacial deposits laid down 10,000 to 20,000 years ago. These deposits have made it difficult to study the fault, but it may compare with the famed San Andreas fault, which gets the blame for many of California's worst shakings.

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## MEDICINE

# New Anti-Cancer Weapon

► A NEW anti-cancer weapon that puts a sharp pencil of killing particles at the center of a cancerous mass inches below the skin's surface has been produced through use of the world's largest operating cyclotron at the University of California radiation laboratory.

Cancer specialists have long wanted a method to irradiate small deep-seated locations without radiation scattering that damaged surrounding tissue. If extended later to human application, research reported by Dr. C. H. Tobias, Dr. John H. Lawrence and Harold Anger of the University of California and Dr. Paul Rosahn of Yale to the American Association for Cancer Research in Detroit will achieve this objective.

Deuterons, which are double-weight hydrogen particles, were accelerated to the ultra-high energy of 190,000,000 electron volts in the cyclotron. They were used to bombard mice with breast tumors, much as X-ray or radium would be used. Forty percent of mice with ordinarily 100% fatal tumors were saved.

The experiments were the first to fulfill the hopeful prediction that high-energy particles would have greater ionization and

cancer tissue-destroying effect at considerable depth than on the skin. Most ionization effect occurs at five and one-half inches deep. Relatively small damage is caused in tissue between this depth and the surface. A spot as small as three-eighths of an inch can be attacked.

Science News Letter, April 30, 1949

## GEOLOGY-ENGINEERING

## Caves And Mines May Not Protect Against A-Bomb

► CAVES and mines may not be adequate protection against stresses caused by "known and projected bombs and guided missiles," presumably including the atomic bomb, George A. Kiersch of the U. S. Corps of Engineers, Sacramento, told a meeting of the Cordilleran section of the Geological Society of North America in Berkeley, Calif.

Mr. Kiersch stressed that his opinions are his own and not necessarily views of the Corps of Engineers.

He said that detailed scientific surveys are needed to determine where and how best to construct subterranean installations strong enough to resist the new weapons.