SCIENCE NEWS

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THE TOTAL ECLIPSE OF THE SUN

THE total eclipse of the sun on Tuesday, January 25, will be best observed in South America and Africa, but spectators in southwestern United States can see a portion of the sun covered by the shadow of the moon.

The farther south spectators from Florida to Texas are, the greater the portion of the sun that will be hidden from them, because of their nearness to the path of totality.

The shadow of the moon will touch earth in the Pacific Ocean near the equator, directly south of lower California, at sunrise. Reaching South America, it will cross the town of Chiclayo on the coast of Peru, go across inland Brazil and finally reach the Atlantic Coast at Fortaleza.

Speeding over the ocean to Africa, the moon's shadow will leave the earth as the sun sets for people in French West Africa. About four hours 20 minutes will be required for the shadow to make its journey.

In its path, a hundred miles or so in width, the moon will completely blot out the sun. In interior Brazil, where the eclipse will last longest, the sun will be covered for four minutes nine seconds, which is unusually long, though considerably short of the seven-and-a-half minutes which an eclipse theoretically can last.

The period of totality in Peru is about a minute less than in Brazil and the sun will be 30 degrees or so lower in the sky. But there is little rain in this desert region and the chances of really seeing the eclipse are much better.

Often the favorable locations from which such total solar eclipses can be seen are almost crowded with astronomers, but this year, due to the war, the eclipse will be poorly observed. So far as is known, only one or two expeditions from Latin America will study the eclipse. The Mexican expedition will observe the spectacular fade-out of the sun from Peru, where the chances of clear skies are much better than in Brazil.

GAS-TURBINE LOCOMOTIVES AND SHIP ENGINES

GAS turbines for locomotives and ships are post-war probabilities, although just at present relatively little development work is in progress because immediate war needs have the right of way.

Economy in performance is one of the advantages claimed for this type of power unit. American and English engineers are investigating its possibilities. Reports from both countries have been issued recently.

Stationary engines of the gas-turbine type have been in successful use a decade or more. They are reported economical in fuel consumption and in lubrication. Being purely rotating machinery, they require but a small amount of lubricants in proportion to the fuel requirements. In steam locomotives lubrication costs may amount to 10 per cent. of the fuel costs.

If found adaptable for locomotives and ships, the gas-turbine engine has another important advantage: it uses no water. Modern American steam locomotives carry often as much as 100 tons of water. An engine that operates without the use of water means not only a saving in the weight carried but also a great saving in the otherwise necessary costs of procuring, delivery, purifying and softening the water. This is considerable in arid regions.

The operation of the gas turbine is similar to that of the steam turbine, but instead of burning fuel oil to generate steam, the oil is burned at nozzles, making a greatly expanded gas which passes directly through the hundreds of vanes on the turbine, imparting to the shaft a rapid and powerful rotation. The principle has been known for many years, but its application had to await the development of alloy metals that would stand up under white-heat temperatures. Such metals are now available.

A new report to the American Society of Mechanical Engineers by a committee on gas-turbine-powered locomotives indicates the possibility of constructing a high-powered locomotive in one unit with the prime mover and all accessories in one cab on two trucks having all the axles and wheels of both trucks power-driven. This would combine great power with light weight. A leading English technical journal, reviewing gas-turbine locomotive development, is of the opinion that this type of power will be used, especially in countries where fuel oil is available. As yet, coal can not be used for the gas turbine, but later coal may be converted to fuel oil more economically than at present making the gas turbine locomotive possible to replace coal-burning steam types. A report, made at the 1943 fall meeting of the American Society of Naval Architects and Marine Engineers, indicates that this type of engine is expected to be as suitable for continuous-duty marine service as the steam engine.

IRON AND STEEL PLANTS IN THE DONETZ BASIN

RETREATING under blows of the Soviet troops, the German armies are destroying everything in their way and have caused great damage to the iron and steel plants of the Donetz Basin. The Russians are working strenuously to restore what the Germans have destroyed. Their work is described by Ivan Frantsevitch, associate member of the Ukrainian Academy of Sciences, in a report prepared by the Soviet Scientists' Anti-Fascist Committee.

Despite wartime difficulties, outstanding specialists of the Iron and Steel Institute of the Ukrainian Academy of Sciences and all other scientists working in metallurgy have pooled their efforts and are working out practical and theoretical problems of the industry.

Academician Maxim Lugovtsev, director of the Iron and Steel Institute, is working on a thermo-dynamic theory of blast furnace processes. Problems connected with the development of new iron and steel industrial sites of the Kazakh Soviet Socialist Republic of the Urals and distant Siberian regions are being studied under his guidance. Academician Dobrokhotov and his associates

succeeded in improving the production of special chromium alloys, such as chromium manganese and nickel chromium steels. Pavel Emelyanenko, associate member of the Ukrainian Academy of Scienees, has worked out new methods of tube rolling; for this he was awarded the Stalin Prize and decorated with the Order of the Red Banner of Labor. Academician Georgi Kurdyumov is completing his research work of many years on the phenomena of heat treatment of steel.

Specialists in rolling submitted a reconstruction plan for the tube industry and details such as type and location of plants to be restored are now being worked out.

Restoration of factory laboratories will require a great deal of work. Many Ukrainian iron and steel plants had excellent laboratories, several of which could rival research institutions. One of these was the laboratory of the Makeyevka plant which was equipped with delicate devices for testing the structure of metals. All these laboratories were destroyed by the Germans.

Now workers have been organized to aid in rebuilding the laboratories and a special organization is being created in the Ukraine for restoring up-to-date factory methods. A group of scientists, including Academician Lugovtsev, is preparing to leave for the Donetz Basin to help to organize the work of reconstruction.

THE SCIENTIFIC ADVANCEMENT OF MEXICO

MEXICO was once the most scientifically advanced country in the western hemisphere. Alexander von Humboldt, the famous German naturalist, explorer and historian who visited there at the beginning of the nineteenth century, set Mexico at the head of all Western Hemisphere nations in cultural attainment at that time.

Humboldt's travels between 1799 and 1804 and study of sciences in Latin-American countries were described by Dr. C. A. Browne, of the U. S. Department of Agriculture, speaking in New York before a meeting of the History of Science Society.

From Mexico, the great traveler pointed out, came the invention of the process of amalgamation of metals, about 1551. Humboldt cited, also, the excellence of the Mexican School of Mines under the direction of Andres del Rio, discoverer of vanadium in 1801.

This historian of Latin America emphasized that the principal source of Mexico's riches was not her gold and silver mines, but her agriculture. Humboldt studied the historical origin, geographical distribution according to soil and climate, industrial use and economic importance of some twenty-five Mexican plant and animal products.

On his scientific journeys, Dr. Browne stated, Humboldt gathered material on the food habits, dress, language, folklore and primitive arts of the various Indian tribes in the Latin-American countries. He studied at first hand the manufacture by the Indians of the deadly poison, curare, as well as silver smelting, which reached its highest development among the Peruvians.

ITEMS

DRS. H. B. HASS and A. L. Barney, of Purdue University, Lafayette, Indiana, recently reported to the American Chemical Society that they have developed a new method of producing menthol artificially. Synthetic menthol which resembles natural menthol in its chemical structure can be produced commercially from thymol. The synthetic menthol has the same taste and odor as natural menthol, and pharmaceutical differences, if any, are slight. The new process is one of distillation, beginning with thymol hydrogenated to a complex mixture of alcohols and ketones. Menthone is produced first, and this is then reduced to synthetic menthol. Thymol is found in oil of thyme, of which there is no particular shortage at the present time. Natural menthol is found mainly in the Orient.

CITIES which have increased greatly in size due to war activities can probably settle down to a more normal existence after the war, as these increases appear unlikely to be permanent. War workers are generally pessimistic about their chances of holding their jobs after the war, according to Jerome S. Bruner, associate director of Princeton University's Office of Public Opinion Research. He reports in a recent issue of the *American Journal of Sociology* that the highest percentage of readiness for migration is in shipbuilding cities, next highest in aircraft towns and the least in steel and automotive centers. Thus Detroit, San Francisco, Oakland, Los Angeles, Washington, Norfolk and other cities which have undergone an increase of from 100,000 to nearly 400,000 since the war may lose a large percentage of this migrant population after peace is declared.

"MECHANICAL functioning of the aircraft engine can be reasonably well established on the test stand, but installation and flight factors affecting its operation in the air have to be determined in the plane itself," was reported by L. C. Miller, of the Wright Aeronautical Corporation, Paterson, N. J., at the meeting of Automotive Engineers. Experimental flight testing at the plant of the manufacturer is advisable. An engine in a plane is subjected to accelerations in three dimensions of space and in many different attitudes with relation to the force of gravity, he explained. "It is difficult, if not impossible, to simulate altitude temperature and pressure variations on the stand and to evaluate these factors on engine performance."

A NEW, highly versatile plastic, named polythene, has been developed by Du Pont chemists and is now ready for the market in commercial quantities—provided necessary allocations for war purposes can be shown by the processor. It is stated to possess physical qualities that will make it useful in such peacetime employments as toothpaste tubes, wire insulation, waterproof coatings, piping and adhesives. In thin sheets it is flexible without being limp and rubbery, while in thicker shapes it is still enough to be classified as a rigid plastic. Polythene is made by the polymerization, or chemical welding, of large numbers of ethylene molecules. Ethylene is a gas derived from petroleum, natural gas and coal, hence is a cheap, easily obtainable raw material.