SCIENCE NEWS

Science Service, Washington, D. C.

A NEW HIGH-TEMPERATURE FURNACE

A FURNACE which utilizes electron bombardments to produce temperatures up to 4,500 degrees Fahrenheit, half as hot as the sun, is being used at the Harvard Graduate School of Engineering to study the basic physical properties and possible industrial uses of 40 metals at present little understood and used.

In announcing the research program it was pointed out that of the 55 metallic groups only 15 have been fully utilized by industry. From ancient times gold, silver, iron, copper, tin, zinc, lead and mercury have served in many ways. Within more recent years aluminum, antimony, bismuth, cadmium, chromium, cobalt and nickel groups have been added to the earlier list. But there still remain 40 metal groups, whose alloy characteristics have yet to be studied, and whose possible industrial application is still in its infancy. Their development may mean as much to industry as the relatively recent development of such alloys as stainless steel, or the tungsten carbide used in high-speed machinery.

The new furnace was invented by Dr. Ralph R. Hultgren, instructor in metallurgy, who has been constructing the apparatus during the past year. Its chief advantage is its ability to eliminate entirely the contamination, by carbon or other metals, which has marked other furnaces. The familiar carbon arc, for example, reaches as high temperatures as the electron furnace, but is markedly inferior as an experimental device because carbon gets into the melted metal, and there is no way of keeping it out. Much higher temperatures than 4,500 degrees could easily be reached by this furnace if better crucibles could be obtained to hold the metals under study. Those now used are made of tantalum lined with thorium oxide and are good only to their melting point, about 5,000 degrees.

The electron bombardment principle has previously been utilized for intense heat in several other fields but the new furnace marks its first application to metallurgy. The furnace consists of a small cylindrical metal cup or crucible, about a half inch in diameter and height, and two filament wires on opposite sides of the crucible. The metal to be studied is placed in this cup and an airtight cylindrical hood, about 10 inches in diameter and 15 inches high, is placed over the apparatus. A powerful vacuum pump reduces the pressure under this hood to about one billionth of ordinary atmospheric pressure. The crucible is then raised to an electrical potential of 2,500 volts. As in the ordinary vacuum tube, this causes electrons to flow from the wire filaments across the vacuum gap to strike the crucible. The heat of the furnace is built up by the energy of these electrons, converted into heat upon hitting the crucible; a conversion precisely similar to the production of heat by hammering metal. Although the energy of each individual electron is infinitesimal, the cumulative pounding of millions of them attracted by the crucible charge produces intense heat.

VOLCANIC ERUPTIONS AND MINERAL DEPOSITS

BOILING floods of lava and glowing clouds of gas are not the only products of volcanoes. Many volcanoes have brought useful and valuable minerals—gold, silver, diamonds or oil, close to the surface where they are accessible. Recenty, reporting his field findings to the Geological Society of Washington, Dr. A. H. Koschmann, of the U. S. Geological Survey, told of the Cripple Creek volcano near Pikes Peak, Colorado, whose eruption 25 million years ago brought millions of dollars worth of gold into the rocks near the surface, where it could be reached by mining operations.

Near Silverton, Colorado, a similar volcano brought 250 cubic miles of new material to the surface at about the same time as the Cripple Creek eruption. Dr. W. S. Burbank, also of the U. S. Geological Survey, stated that this created the famous Camp Bird mining area, which built the fabulous fortune of the late Tom Walsh. To date, more than $270,000,000 in gold and silver have been mined in the San Juan area near Silverton, of which $30,000,000 came from Camp Bird. After the first eruption of the Silverton Volcano, one of the craters, eight miles in diameter, collapsed, opening hundreds of fissures in the surrounding rock, which were later filled with rich deposits of gold and silver, some of them five to seven miles long.

Volcanic activity in the ancient Gulf Coastal Plain, an area which now includes Texas, Arkansas and Mississippi, brought diamonds to Arkansas, and formed oil traps in other areas, according to Dr. Hugh D. Miser, of the Geological Survey. Erupting eighty million years ago, the ancient volcanoes were discovered during drilling operations only since 1915. Dr. C. S. Ross, government geologist, reported that New Mexico, a million or so years ago, had a volcanic lake in the Valles Mountains similar to the present Crater Lake in Oregon. This crater, which is the largest explosive crater known, was 17 miles long and 13 miles wide.

SOME FURTHER PAPERS READ AT THE INDIANAPOLIS MEETING OF THE AMERICAN ASSOCIATION

AN immense store of food, rivaling the nation's buried gold reserves in value, is advocated for America as a super-normal granary for use in the emergencies of drought, war or other disaster. Professor R. B. Harvey, of the University of Minnesota, suggested that it would be more logical to have a food reserve that could feed the nation in an emergency than it is to have a gold reserve that has very little practical value; that the government could well spend as much as twelve billions of dollars for plant and animal products that could be held in reserve for decades, not mere years. Since he is one of the leading plant physiologists of the nation and the originator of chemical methods of blanching and ripening fruits and vegetables, his technical knowledge gives the long-time storage suggestion support. "It is best not

to plow under cotton or corn, not to decrease farm production by allowing weeds to grow on arable land and pay for it, but to get the best production of the crop best adapted to the soil and store the excess as a national reserve. We do not know how soon we may be in need of such reserves to release man power. We need to learn how to distribute and conserve maximum production, rather than how to restrict production to a minimum.'' Professor Harvey is confident that physiologists, chemists, pathologists, entomologists and other specialists can work out large scale methods of storage so that food can be kept fresh and edible over long periods. Wheat, for instance, is known to be good to eat after fifty years. Meats, fats and carbohydrates when properly prepared can be stored almost indefinitely.

POSSESSED of more highly skilled automobile drivers than any other age-group, 100,000 drivers between 16 and 20 years of age kill nearly twice as many on the road as the average 100,000 drivers. Accident rates for those below 25 years of age are so high that bringing down that age group's accident rate to the general level would save nearly 8,000 of the nearly 40,000 killed each year on the American highway and street. These challenging figures in support of the contention that certain groups of people are more likely to have accidents than are others were presented to the meeting by Dr. Harry M. Johnson, research associate for the Highway Research Board, Washington. Young men between 19 and 21 years of age are apparently the worst menaces on the highway, Dr. Johnson stated. Middle-aged men, between 46 and 55, may be a bit slow as compared with their younger traveling mates, but they are involved in relatively far fewer accidents. Knowledge of their own skill and consequent willingness to take chances beyond their own capacity to meet were tentatively blamed by the speaker as the factor chiefly responsible for the great proportion of accidents among youthful drivers. ''Some skillful drivers, relying on their agility and alertness, may enter hazardous situations that are a little beyond their ability, whereas less skillful drivers, being aware of their weaknesses, may stay out of them.'' Nearly 30,000 drivers registered for the six years from 1931 to 1936, inclusive, in the state of Connecticut, were the experimental raw material, study of which led Dr. Johnson to these conclusions. Fatal accident figures were compiled from a study of 2,165,241 drivers over a period of five years. His work is being carried out as a joint project of the Highway Research Board and the U. S. Bureau of Public Roads.

AN instrument which increases safety for the mounting thousands of America's airline passengers was one of the leading demonstrations shown at the exhibits of the association. The instrument is the hazeometer from the National Bureau of Standards in Washington. It measures the ''haze,'' or light scattering properties, of the new transparent plastic materials which now are used in the pilot's windshield of high speed transport planes. These plastic windows have replaced glass in airplane cockpits. For one reason they do not rupture when the plane runs into birds. Such accidents are rare, perhaps, but have occurred with enough frequency to warrant safety measures not only for the pilot but also for the safety of his passengers and cargo. The flexibility and strength of these plastics plus their light weight have made them valuable for air transport despite their higher cost than glass. The hazeometer has never before been exhibited, according to officials of the National Bureau of Standards. It was developed by Dr. Gordon M. Kline and Benjamin Axilrod, of the plastics division of the laboratory. While the plastic materials used in the new windshields and windows are strong and light in weight, they are less permanent than glass. They scratch and gradually show surface markings which eventually fog the whole surface. The object of the hazeometer is to test readily the ''fogging'' of the plastics. Until recently the U. S. military services demanded that plastic sheeting should transmit 68 per cent. of white light when tested within 30 days after delivery. Present transparent plastics now in general use transmit about 85 per cent. of the incident light. The hazeometer is a black box about four feet long containing an automobile-lamp light source at one end and a photoelectric cell at the other. By placing the plastic sheet directly in front of the photocell all the light coming through it, scattered and unscattered, can also be measured. The ratio of these two intensities is the measure of the ''haze'' created by the plastic sheet.

MOBILIZING for the war against syphilis must be on a scale like that for a war against a foreign foe. The hugeness of the task was driven home by Surgeon-General Thomas Parran, of the U. S. Public Health Service, in an address before the association. Individuals can not bear the cost of fighting the disease. The lowest price for treatment of syphilis by a private physician is about $300. Over one fourth of syphilis patients who go to physicians to be treated have an income of $1,500 or less. The cost of caring for patients made insane or blind by syphilis is $41,000,000 a year. This huge figure only includes the care of those who are in institutions. Blindness and insanity are only two of the disabling results of untreated syphilis. Total cost of caring for syphilis victims is beyond estimating. The war against syphilis, Dr. Parran made clear, must be financed by states and nations as any other war must be. Unlike other wars, the cost of fighting syphilis can be balanced by the saving of millions of dollars now spent to care for the victims of the disease. Dr. Parran stated that spending public funds for the control of syphilis is a matter of simple economy.

ITEMS

ALMOST all the snow geese in the world are concentrated this winter on a group of low islands off the coast of North Carolina, where rainwater bogs make living conditions favorable for them. The 8,000 or so birds are believed to constitute approximately 98 per cent. of the world's total snow-goose population. They breed in northern Canada during the summer, and fly south for the winter.

REVISION of our maps of the moon may be necessary as a result of the discovery of a series of craters and walled plains, near the edge of its visible disk by H. Percy Wilkins, British astronomer, who reports his new discoveries in the *Journal* of the British Astronomical Association. Occupying twenty degrees of latitude on the southeast edge of the moon, this tangle of walled valleys, craters and high peaks has escaped discovery for many years, chiefly because nobody looked there carefully enough until now. Commenting on Mr. Wilkins's discovery, Dr. Walter Goodacre, acting director of the society, recommended further observations of the moon's edges, which may lead to additional discoveries.

YEARS of drought, like the seven lean years of Joseph's Egypt, are due to grip the Great Basin area of the West, Dr. Ernst Antevs, of the Carnegie Institution of Washington, prophesies in the new scientific publication of the American Geographical Society. Dr. Antevs has made a special study of climatic cycles that swing over long periods of time. He finds that the down curve in far western rainfall has already begun, and states that it is due to reach its climax in a terrific drought about ten years hence. The region for which Dr. Antevs makes his forecast lies between the Wasatch Mountains in the Sierras, comprising about 175,000 square miles in the states of California, Nevada, Utah, Idaho and Oregon. He feels that farmers and stockmen in this region should make long-range plans to meet the situation.

CHEMICALS even more potent than prontosil and sulfanilamide, in overcoming streptococcus and pneumonia infections in mice, are reported by Dr. Sanford M. Rosenthal and Hugo Bauer, of the U. S. National Institute of Health. Human trials have not yet been made of the new chemicals. Prontosil, product of the German dye industry, burst on the medical world a little over a year ago as a spectacular, life-saving remedy for deadly streptococcus infections of mothers following childbirth. Other human ills caused by the streptococcus and by various other bacteria were soon found to yield to prontosil. No sooner had reports of its usefulness in treating disease appeared than chemists in England, France and the United States began analyzing and trying to improve it. The first result of this research was the discovery that the related chemical, sulfanilamide, was as good as prontosil itself. Further research has developed chemicals that are 5 and 6 times as good as sulfanilamide when used to treat mice infected with streptococci. One of these chemicals, the formaldehyde sulfoxylate derivative of sulfanilamide prepared by Dr. Rosenthal and Mr. Bauer, has the advantage of being soluble in water. This should make it easier to use for treatment of infection since ampoules of the solution can be made up in advance and kept ready for use. Heretofore it has been necessary to dissolve the dry material just before using it.