SCIENCE NEWS

WATER FROM BURNT GASOLINE IN AIRSHIPS

Science Service

THE cruising radius of airships, such as the great navy dirigible *Shenandoah,* will be greatly increased as a result of an invention now approaching completion as the result of months of study by the government's aeronautical and scientific experts. The device makes it possible for the ship to burn up its store of gasoline without loss of weight and without increase of buoyancy. This will result in the saving of many thousands of dollars worth of the expensive helium gas that lifts the ship and which otherwise would have to be released and wasted in the air to keep it from rising to dangerous heights.

The principle employed is simple. It involves the condensation of the water vapor resulting from the burning of the gasoline, and the retaining of it in the craft as ballast.

Gasoline is composed of carbon and hydrogen. When burned, the products are carbon dioxide, carbon monoxide and water vapor. The first two gases escape. The last is condensed. Since gasoline requires more than three times its weight of oxygen for complete combustion and since about a third of that goes to form water, the weight of the condensed water is somewhat greater than that of the original gasoline.

This keeps the weight of the airship constant and makes unnecessary a loss of the lifting gas, which heretofore has been a feature of long flights. In an airship without the condensing device, the craft grows lighter as the voyage progresses owing to the consumption of the liquid fuel. This results in the airship rising higher and higher until in the interest of safety some of the buoyant gas has to be liberated. This reduces the reserve buoyancy if unfavorable conditions are met, and so curtails the length of flights.

Airships of the future equipped with the compensating water condensation device will be able to carry up fuel in quantity only limited by the buoyancy of the craft and the requirements of space, and will be able to burn it without releasing a compensating quantity of the precious helium gas.

Water condensation apparatus will be installed on the *Shenandoah,* formerly the ZR-1, before long flights through the polar regions or elsewhere are attempted, according to present plans of the government experts. If the airship of commercial type, the ZR-3, which is now being built for the United States by the German government, is successfully delivered to this country, it also will be equipped with the new invention.

VAPORIZED METAL

Science Service

BRONZE covered statues, copper-covered shingles, concrete piles, or railroad ties, and gold covered furniture are some of the possibilities ensuing from a process for spraying metals, which after years of study is approaching perfection at the U. S. Bureau of Standards. An exhibit showing stone, cement, metal, wood and glass which had been coated by the new process attracted wide attention when shown by the Bureau in the recent Chemical Industries Exhibition in New York.

The essential of the process is that the metal is first vaporized and then sprayed on to the surface to be coated by means of a powerful blast which congeals it to the solid form as quickly as it strikes the surface. Details of the process are withheld by the bureau at present for military reasons, except for the statement that it is based on a new principle and that electricity is used in the vaporization process.

Applications of the method, which results in a firm coating of metal upon any surface to which it is applied, are many and varied. Stone, wood, metal and glass are all equally suitable basic surfaces. Pottery may be successfully coated with metal, pointing to important developments in the ceramic industries.

An important application is in the use of the metal coating in building construction. Shingles may be made fire resisting by coating them with copper, which weathers well and produces an artistic green color on the roof. Experiments are already being made along the lines of copper coating other roofing material and stucco.

Soldering of metal to glass, a difficult problem, has been easily accomplished by means of this method. The glass is first coated with a layer of copper and the metal connection is then soldered to the copper. Processes somewhat similar are used in the soldering of aluminum.

The preservative qualities of metal-coated articles are attracting attention from many quarters. It may be used in airships, and is being experimented with as a marine paint for naval vessels, certain alloys being highly resistant to salt water corrosion and inhospitable to the growth of barnacles. For the same reason it may be used to protect piling and its preservative action may also be used to conserve railroad ties.

On the decorative side the uses of the method are many. Statues or other sculptured designs may be hewn from soft and easily worked stone and then coated with bronze, giving the effect of a bronze statue and weathering equally well. Gold plating or decoration may be applied in the same way to furniture or table ware.

A coating of copper one thousandth of an inch in thickness may, so its inventors say, be applied at the rate of two square feet a minute and at a cost of two cents a square foot exclusive of the cost of labor. Cheaper and more easily fusible metals such as lead would cost less.

SALT AND HEAT EXHAUSTION

Science Service

DILUTE sea water or salt water in any palatable form may be the basis of future soft drinks for hot weather

and tropical climates. A long series of experiments on workers in hot mines has shown that a small quantity of salt daily has the power to relieve the men of much of the exhaustion supposed to be due to severe toil at high temperatures and to prevent altogether the development of the dreaded miners' cramp. Men given about one third of an ounce of common salt dissolved in a gallon of water reported themselves stronger and fitter in every way.

The experiments were carried out under the direction of K. Neville Moss, professor of coal mining at Birmingham University. They showed that during work at high temperatures men lost an abnormal quantity of salt through the perspiration. Since salt is an essential constituent of the blood, Professor Moss thought it likely that the cramps and nervous symptoms due to excessive heat and work might be alleviated or prevented by administering salt to the workers and the results have justified his theory.

Measurements showed that during a five and a half hour working shift at a temperature around 100 degrees, the men lost from nine to eighteen pounds through perspiration and respiration. This was not a net loss, as during that time they consumed an average of seven and a half pounds of water. Other men who worked in a specially heated testing room in a laboratory showed similar losses and a loss of about twice as much salt from the system as would occur under normal conditions.

It has long been known that the drinking of large quantities of water while at work was apt to cause cramps among workers at high temperatures, but this had been attributed to local causes in the stomach. Professor Moss believes it to be due to the washing out of the essential salt from the blood and to confirm his theory points to experiments on animals in which similar symptoms have been caused by forcing large quantities of water down their throats.

He also discovered that men who worked in hot mines showed a greater taste for salt food than those who worked under normal conditions, the average consumption of salt being a third greater among the former class. Another surprising fact brought out was that the workers in the hot mines ate more food of all sorts than those who worked where it was cool. The reason for this he says is not clear, but it may be due to the extra work put on the sweat glands.

It was also shown that the ability to sweat freely is acquired by practice. Men not accustomed to mine work who were put through the tests did not perspire anything like as much as experienced workers, while one of the latter after a vacation was several days getting back his perspiratory pace.

THE SANTA BARBARA SKULL

Science Service

ANTHROPOLOGICAL experts of the Smithsonian Institution expect that scientific investigation by men trained in bone study will prove that the age of the supposedly primitive skull found at Santa Barbara, California, has been greatly overestimated. This expectation is based on long experience covering numerous finds of so-called primitive man on this continent.

Photographs and a complete report of the discovery of this so-called "Santa Barbara" man are expected by the Bureau of Ethnology of the Smithsonian Institution in a few days. A telegram received from J. P. Harrington, language expert of the bureau, who made the find, described it as of "primitive type" and in a statement alleged to have been made by him in Santa Barbara he is quoted as attributing to it greater age than the famous Neanderthal cave man of Europe.

The Neanderthal man lived, it is estimated, more than 25,000 years ago. The earliest human remains so far found in America date back only about three thousand years. This earliest American was found at Leland Stanford University.

According to Dr. Aleš Hrdlička, curator of physical anthropology of the Smithsonian Institution, his division has for years investigated numerous reported discoveries of remains of prehistoric people of supposedly great antiquity. Only last month the bones of a race of prehistoric dwarfs were reported from New Mexico. Upon examination the bones proved to be merely those of young children. Leg bones of mastodons and other prehistoric elephants have even been attributed to a race of human giants by discoverers with a great deal of imagination.

In 1916, near Vero, Florida, remains were found which for a time were thought to be those of a very primitive type of human being. Painstaking study led to the conclusion, however, that these bones were of the modern Indian type. Some skulls known to be those of Indians who have recently died show pronounced sloping of the forehead and high bony ridges over the eyes which the uninitiated might easily mistake for the European cave-man type.

Before leaving for the West, Mr. Harrington declared that the Indians had been on this continent for 20,000 years. He based his estimate largely upon the differences developed in various Indian languages. The bone experts have found nothing to confirm the theory that Indians have been here so long.

THE HEARING OF PHEASANTS

Science Service

Do pheasants and other birds hear sounds which are inaudible to human ears? That is a question brought up by Dr. Charles Davison, leading seismologist, in a discussion of the distances at which great explosions may be heard. Pheasants during the great war showed evidence many times of being greatly disturbed by air waves resulting from explosions or naval battles which were not heard by human beings, and their behavior has thrown light on the problem of the so-called "zones of silence" around great detonations which beyond these zones are again audible.

These "inaudible sound waves" cause the pheasants to crow, scream and flutter about as if greatly frightened. Such behavior was observed at many points in England at the time of the naval battle of the Dogger

Bank on January 24, 1915. At a distance of 216 miles from the action, pheasants "shrieked themselves hoarse" and smaller birds were terrified, although not a sound was heard by human ears. The greatest distance at which the birds were affected was 320 miles. The same effect was produced by the explosion of Zeppelin bombs, the birds reacting to explosions 80 miles away, beyond ordinary human earshot.

In some cases people did hear the noise of the cannonading 200 miles or more away, but if this were on the far side of a silent zone the pheasants were affected a little before any one heard a sound, indicating that the inaudible waves traveled a little faster than those which were heard. But if the point of observation were on the near side of a silent zone, the audible waves arrived first. It is suggested that the inaudible waves travel across the silent zones close to the ground, while the waves which are heard farther on make a detour upwards across the zone and arrive a little later because of their longer course.

Just what effect these "silent waves" have on pheasants is not known. The theory that they "hear" them is opposed by the fact that the audible waves produce no effect upon the birds. The inaudible waves are of long wave length and set up vibrations in loose articles, and it is thought more likely that the birds are frightened by the quivering of the branches upon which they may be resting.

BEAVER FARMS

Science Service

BEAVER farms to test the practicability of raising these famous fur animals in captivity on a commercial scale have been started in southern Michigan, according to Vernon Bailey, chief field naturalist of the U. S. Biological Survey. Two sites were stocked with beavers and experiments begun which will probably take three years to complete, but which may result in making valuable considerable areas of now unproductive land.

Efforts will be made to determine the proper number of beavers to an acre of land, the effects of large numbers on the health and increase of stocks, breeding habits and similar information important to the commercial fur farmer.

Although these rodent engineers are capable of doing considerable damage by felling trees, building dams and flooding land and killing timber, Dr. Bailey believed that by placing them on unproductive fenced lands they may be made to yield substantial returns in an annual fur harvest.

During the summer Mr. Bailey also perfected a trap to catch the beavers alive in water. Beavers caught in these traps near Lake Superior were transported by rail to the two farms in the southern part of the Michigan peninsula. Losses were experienced due to the fear and nervousness of the animals in transit.

A hundred years ago the beaver was America's leading fur animal, and it played an important part in the development of vast regions in the West and North. Beaver skins were once the unit of value in the traffic between white trappers and the Indians.

Unrestricted trapping later threatened the complete extinction of the beaver, but in the last twenty years under protection they are now returning to many parts of their former range. A great part of their original range is now under cultivation.

ITEMS

Science Service

SEPTEMBER had the lowest death rate ever recorded for any month in the history of the Metropolitan Life Insurance Company, according to figures given by Dr. Louis I. Dublin, statistician. The death rate among the industrial policyholders of that company was only 7.1 per 1,000 per year. Figures for the third quarter of 1923 just compiled also show a record for that period, the death rate of 7.4 being the lowest recorded for those three months of any year. Automobile fatalities continued to increase, showing a rise of 11 per cent. from last year's figures. On this basis, Dr. Dublin considers it probable that the total deaths in the United States from this cause during 1923 may reach the high number of 15,000. Deaths from tuberculosis and typhoid fever continue to show substantial decreases and are expected to establish new low records. Alcoholism in Dr. Dublin's compilation accounted for 323 deaths during the first nine months of the year as compared with 293 for the whole of 1922.

SUCCESSFUL photographs of the recent total solar eclipse (September 10) were obtained by the University of Arizona Expedition which went to Port Libertad, on the east coast of the Gulf of California, sixty miles north of the Tiburon Island, according to Director A. E. Douglass, of the Steward Observatory. "Pictures of various exposures in telescopes from four to forty feet in focal length were obtained. These show prominences and fine detail in the corona, including a coronal arch of the kind seen in recent eclipses. In this case, however, the arch is somewhat dim as though seen through much thickness of intervening matter." Dr. Douglass headed a party of nine that had to travel by automobile over roads which had been badly washed out by summer rains which were still in progress. At the observing station on the coast the sky overhead and to the west was clear, while heavy storms hung over the mountains to the east. Most eclipse expeditions in California were total failures on account of cloudiness.

OBSERVATIONS of Professor G. H. Peters, of the U. S. Naval Observatory, show that a new sun spot period has started. New periods begin with the appearance of spots in the high solar latitudes far from the sun's equator and such spots have already been noted. According to tentative calculations, the time of sun spot minima was reached in the latter part of February. Electrical disturbances such as have been frequently associated with increase in sun spots occurred during the past month. Whether such disturbances are connected with the sun spots can not be stated definitely. The number and size of the spots will gradually increase until a maximum is reached, and then the number will begin to fall off. It takes on the average a little over eleven years for the spots to complete this cycle.