ENGINEERING

Hunt for New Power Sources

Threat of natural fuel exhaustion in the future is spurring scientists to search for new sources of power in atomic energy, solar energy and the tides and winds.

By A. C. MONAHAN

➤ THE future of the present machine age demands new sources of power. There is fuel enough for the needs of today, but all are agreed that the supply of the natural energy-producing fuels may some day be exhausted. This is particularly true for the liquids that power such mobile equipment as automobiles and airplanes.

Scientists are already busily engaged in a search for new fuels and for fuel substitutes. Research is directed toward atomic energy, solar energy and the now-wasted power in tides and winds. There is coal enough to last for many centuries, although the better and more desirable grades may be exhausted much earlier. It is anybody's guess how long man will be able to get crude oil or natural gas from the crust of the earth. Wood will always be available if proper forestry practices are followed.

But it is certain that new sources of power will be needed for future years, and are needed even now so that present fuels can be made to last as long as possible, particularly for specific applications.

Coal Supply

While it is true that the United States has a greater supply of coal than most nations of the world, this fuel can not be used directly to power the 40,000,000 motor vehicles on its highways or the many thousands of planes in the air. These require a mobile source of power, such as is available from liquid or gas-burning internal combustion engines.

These are dependent largely on liquid fuels, mostly petroleum products, although alcohol and other chemicals might be used. It is important that practical methods be developed as rapidly as possible to make liquid fuels from coal, shale oil and tar sands to conserve the underground petroleum which made the automobile age and the air age possible.

Atomic energy has been widely talked about as power for aircraft in the future. Early applications need not be expected. But atomic energy as a source of power for aircraft promises achievements unobtainable with standard fuels, a scientist-engineer working on the problem recently stated.

From results already obtained in reactor development, an atomic scientist recently said, "we should be able to design full-scale reactors, atomic-energy devices, to produce electric power in quantity. It is by no means clear at present how long this will take, but I believe that it should be within eight or ten years." The statement was by Dr. Robert F. Bacher of the U. S. Atomic Energy Commission.

"The real problem in developing nuclear reactors as a source of energy for the future depends, not upon the availability of raw material, but rather upon the two-stage process of first making this production of energy technically feasible and then trying to make it economically feasible, he stated. Whether or not it will become economically feasible is the real question. I believe," he added, "that the long-range future for the development of atomic energy is very promising."

Although electricity is primarily for stationary plants, it is widely used in portable machines ranging from household eggbeaters to powerful drills used in mining. These applications, however, require wire connections to powerlines and are usable only within the length of the connecting wire. They are not for mobile units such as the automobile or the aircraft.

Most electrical energy produced in the world today comes from fuel combustion. The other great source is from water power. There is still plenty of undeveloped water power in the United States, and engineers predict large developments within the next generation or so. Some say that the amount available could easily be increased at least tenfold. But, hydroelectric energy can never fill the total of America's power needs.

Electrical Energy

Many of the sites suitable for the development of water power with which to make electricity are entirely unsuitable for industrial activities. The terrain of the land may be responsible, but more often it is the distance from raw materials and markets. Electrical energy, of course, can be transmitted by wire relatively long distances, but the cost of transmission equipment is high, the loss of power is great, and there is a practical distance beyond which transmission is uneconomical.

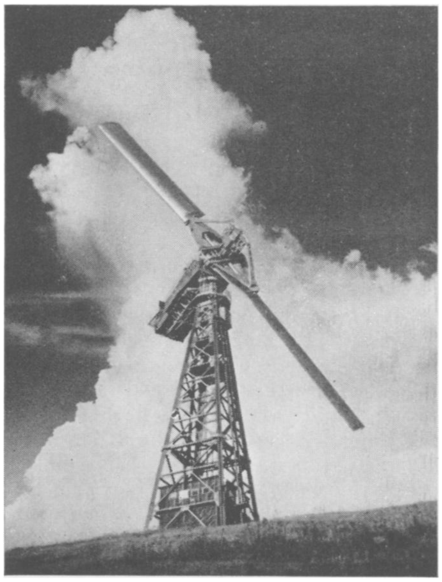
Direct power from the sun, and power from the tides and wind, are proposed as possible sources for energy little used at the present time. Solar energy seems to hold the greatest present interest. It is widely used now, but it is not the daily energy reaching the earth in the rays of the sun. It is solar energy stored up decades and centuries ago in the wood that is burned, and the sunlight that grew the vegetation millions of years ago that provides the coal and petroleum of the present.

Waterpower might also be regarded as a source of indirect solar energy. Water in its travel circuit is converted to a vapor on the surface of the earth, lakes and seas largely by the energy of the sun. It drifts in clouds over the land, and the part that falls as precipitation on the highlands is the water available for power. What the scientists are now trying to do is harness the energy of the sun for direct and immediate use.

Solar Energy

There is far more effort being devoted today to the direct utilization of solar energy than is generally appreciated. Present experimental work is largely for house heating, to save other fuels, and to gain experience for later application of sun heat to power plants. By the use of large double glass windows on the south side of a building, interiors are now being kept comfortably warm during sunshine and early evening hours. The problem is how to store up the heat of the sun for use at night and for cloudy winter days. For power applications this captured heat will have to be concentrated.

Scientists, at the Massachusetts Institute of Technology are trying several storage systems. In a dwelling completed early this year, water is used for heat storage. In a



SEARCH FOR NEW ENERGY—This modern windmill near Rutland, Vt., a Smith-Putnam wind turbine, is being studied for possible unused source of power.

dwelling erected even earlier, and now in use, a chemical is used for the purpose. Glauber's salt is satisfactory for the purpose. This is a common substance, a form of sodium sulfate. Storage in iron, marble, concrete and other materials has also been tried.

The house with the sun-heated water is an ordinary one-story building with five rooms, except for its roof structure. The south slope of the roof, with the heat collector, inclines 57 degrees with the horizontal, presenting 400 square feet on which the rays of the sun are received. Their heat passes to a tank of water. When warmed by the sun, the water is pumped to a storage tank, and from there to room radiators as needed.

The principle behind the use of Glauber's salt, or certain other chemicals, makes use of latent heat, or what is now more commonly called heat-of-fusion. It is the heat necessary to convert a substance from a solid to a liquid state, and is not evident in a temperature raise. It takes as many calories of heat, for example, to change ice into water as it does to raise the temperature of the resulting water up to about 175 degrees Fahrenheit.

The system of heat storage in a chemical used in the M. I. T. experimental house is largely the work of Dr. Marie Telkes of the Institute staff. The chemical is sealed in containers. There is no loss of the material. Glauber's salt melts at about 90 degrees Fahrenheit. This is low enough to result in liquefying when the rays of the sun are focused on it, even in winter weather. When heat is needed in the house, air from the rooms is circulated about the sealed containers by use of a fan or blower.

The same research that has developed the best types of propellers for airplane propulsion has been applied to windmill blades to capture the greatest possible amount of the energy of the wind. Also blades have been developed to operate when the air movement is very low. Considerable success has been obtained. Windmills of the future may play an important part in generating electricity to supplement energy from waterpower and other sources. The supply delivered will be erratic, depending upon the winds. Wider use of windmills in farm pumping and operating generators to feed storage batteries may be expected.

Tidal power has been used for many years in various parts of the world. It is regular and reliable, but there are relatively few sites where the tides are high enough to produce economical power. The high tides on New England's rocky coast can produce power to drive electric generators. To use them or not is largely a question of economics.

Science News Letter, August 6, 1949

ZOOLOGY

War on African Snail

➤ EVEN before the giant African snails made their recently reported landings on the American west coast, scientists had begun battle against them. The Pacific Science Board has sent two men into the trusteeship area of Micronesia in the mid-Pacific to carry on a four-months' study of their life-history and ecology, as a basis for future campaigns aiming at their elimination. This team consists of Dr. A. R. Mead of the University of Arizona and Dr. Hoshio Kondo of the Bishopp Museum in Honolulu.

A husband-and-wife team, Dr. and Mrs. F. X. Williams, has already been in the East African region that is the snails' natural home, seeking natural enemies that may be introduced into snail-infested areas to carry on biological warfare against them. One of these, a big, hungry black beetle, seemed quite promising at first; but it now appears most likely that the big snail's most effective enemies are two other snail species, both of them fiercely predacious—the leopards of the African snail world.

The huge snails, which attain an overall length of more than seven inches, were carried to all the islands of Micronesia held by the Japanese under the old League of Nations mandate. They were used for food, also chopped up to feed to chickens. Most of the Japs didn't really like them, however, declares Dr. R. Tucker Abbott, malacologist of the U. S. National Museum. They ate them all right, "but with wry faces," he says.

Their presence in the Hawaiian islands is traced to this food use by Japanese. At least two importations were made by ordinary mail, and the snails kept as penned animals to be killed and eaten as wanted. As soon as the territorial authorities learned about it they swooped down on the snail-pens and tried to make a complete kill. However, some of the creeping mollusks escaped, and Hawaii now has a major snail pest to contend with.

There is nothing in American law or postal regulations to prevent free shipment of any kind of snails. The European edible snail featured by French restaurants, for example, can be shipped without hindrance. It makes American pest fighters uneasy, but unless there is legislation on the subject they can do little to stop the traffic.

There may be colonies of the giant African snails in an unknown number of places in this country because of this situation. One is definitely known about: it is maintained by 90-year-old Prof. E. A. Andrews of the Johns Hopkins University, for the purpose of scientific study. He feeds his slow-moving pets on lettuce.

Even if the African pest gets out of hand in this country it will not be an unlimited calamity. The snails are definitely warm-climate animals, and are exceedingly unlikely to become established where freezing weather is an annual occurrence. But they can do a vast amount of mischief in the warmer parts of the United States.

Science News Letter, August 6, 1949

ENGINEERING

Flywheel Tire Tester Used For Plane Landings Study

➤ A BIGGER and a better flywheel tire tester for use in determining what happens to the tire on a speedy plane when it hits and rolls on the runway, is to be installed at Wright Field, Dayton, O., soon by the U. S. Air Force. It is what might be called a small-space apparatus that eliminates the need for testing by actual plane landings.

The flywheel to be used is seven feet in diameter and three feet wide. It is to be installed in a fixed base and rotated by electric controls at speeds up to 250 miles an hour. Similar equipment already in use has a maximum speed of 200 miles an hour.

In use, the wheel is stationary except for its high speed of rotation. The tire to be tested is mounted on a separate shaft. After the flywheel has reached the desired speed, the tire is moved against it. The tire will get the same initial shock as it would get on a plane in landing on a runway. Slowing down the flywheel speed gives the same effect as a pilot applying the brakes, and the tire gets the same wear.

The flywheel is under construction at the Adamson United Company, Akron, O., and the 150-horsepower electric motor and the necessary controls will be built by Westinghouse Electric Corporation, Pittsburgh, Pa.

Science News Letter, August 6, 1949

AGRICULTURE-CHEMISTRY

Corn Hybrids Differ In Resistance to 2,4-D

➤ THE common weed-killing chemical, 2,4-D, is more injurious to some varieties of hybrid corn than to others, it has been shown by recent experiments conducted at the Iowa Agricultural Experiment Station by Elmer C. Rossman and David W. Staniforth. As the use of 2,4-D increases this may become an important factor to consider in selecting hybrid corn varieties for planting.

Contrary to common popular opinion, 2,4-D may injure corn and other members of the grass family, although in the doses ordinarily used it will not kill them. In the Iowa experiments the 2,4-D caused reductions in the yield of corn, a reduction in the number of brace roots, defective tassel formation, and a larger number of weak seedlings when the grain from the treated corn was planted.

Science News Letter, August 6, 1949