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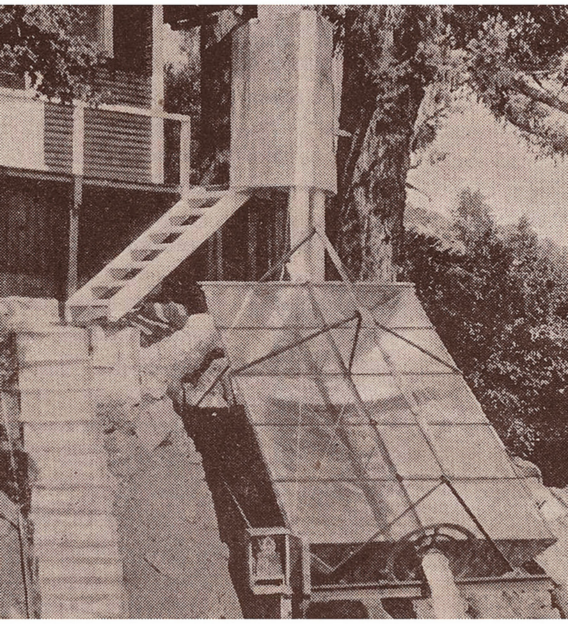
Putting the Sun's Rays to Work for Man

The Enormous Amount of Energy Represented by Sunlight, and the World's Dwindling Natural Resources, Tempt Inventors to Renewed Effort to Harness Solar Power



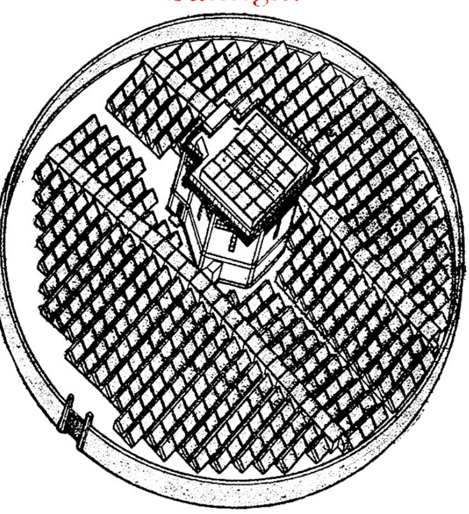
Doctor Abbot's solar cooker: the paraboloidal mirror is the trough-like contrivance in the right foreground. The oil reservoir and ovens are above

IF all the energy of the sunlight falling on the earth could be turned into power, it would amount to an average of about one horse-power per square yard. The actual amount, at any one place, would vary according to the latitude, altitude, and weather, but, in the aggregate, the energy received by the earth, each year, if transformed into power, would be more than 1,000 times as great as that derived from all the coal, oil, and water-power used annually in the United States.

Bounty, Free for the Taking

This astounding bounty—falling everywhere, and apparently free for the taking, has tempted many an inventor. The trouble is that this, like many of the other great reservoirs of natural wealth, has been harder to tap than would appear at first.

The latest large-scale effort to harness the sun is taking place at Tashkent, capital of the Uzbek Soviet Republic of Central Asia, U.S.S.R. Near this city, Soviet scientists, according to *Science Service*, have been operating a kitchen, bath, and water-tower with power supplied by the sun, and are engaged in preliminary experiments looking toward the erection of a solar power-plant of 30,000 kilowatts capacity. The primary purpose of the plant will be to pump water. The scientists expect to develop a sun-power pump capable of delivering more than a million gallons of water in ten hours.



Design for a solar energy station to be erected at Tashkent, U.S.S.R.

The success of the Russian scientists with their "solar kitchen" has been paralleled by a similar experiment in this country: the solar cooker devised by Dr. C. G. Abbot, Secretary of the Smithsonian Institution at Washington. Doctor Abbot, one of the foremost authorities on solar phenomena in America, has fitted up the cooker on Mt. Wilson, California, near the Mt. Wilson Observatory, where he goes nearly every summer to carry on astronomical studies.

A special virtue of Doctor Abbot's cooker is that it continues to cook throughout the night, and an occasional cloudy day does not greatly reduce the efficiency of the oven. This is managed by storing the sun's heat in oil, which keeps hot for a long time in a carefully insulated tank. The hot oil circulates around the two cooking-ovens in the oil reservoir, and maintains a temperature of about 175 degrees Centigrade (357 degrees Fahrenheit) which is adequate for all usual cooking operations, such as stewing, preserving, boiling, and baking of meats, and even the baking of bread.

The rays are caught by a trough-shaped mirror made of polished strips of aluminum. The reflector-surface, which is twelve and a half feet long, and seven and a half wide, is paraboloidally curved, and brings the sun to a focus upon a blackened pipe which passes through the trough from end to end. The trough is tilted up until its axis points to the Pole Star, and is so mounted that it can turn on the axis, thus following the sun from east to west. It is driven by an ingenious mechanism which Doctor Abbot constructed from an alarm-clock, and a gadget for turning a rotating window-display.

The oil-reservoir is above the mirror. The cool oil flows by gravity out the bottom of the reservoir through a pipe which passes under the mirror. It returns through the pipe placed in the focus of the mirror. No pumps are necessary, since the hot oil rises through the pipe just as does the water in a heater. Doctor Abbot selected oil for his cooker because it retains heat for a long while, and boils at a considerably higher temperature than water. Had water been used, it must have been kept under a pressure of 200 pounds to the square inch.

Despite its success, Doctor Abbot does not consider his cooker commercially practicable. It would cost $800 to duplicate.

Inventors have been attempting to harness the sun's rays for at least fifty years. Nearly that long ago an experimenter named Adams devised a simple solar cooker in India. A similar device, on a larger scale, was built several years ago by A. G. Eneas, in California, to generate steam for a small engine. The boiler was at the focus of a large conical reflector.

Just before the World War, a huge solar power-plant was built at Meadi, Egypt, to furnish power for pumping water. Known as the Shuman-Boys solar engine, this scheme utilized several long trough-like mirrors to focus the sun rays on boiler-tubes.

Another plan was tried about 1908 at Needles, California. A shallow pond, with a blackened bottom, and a glass cover, was constructed by the inventors, Willsie and Boyle. The water was heated by the sun, tho not to the boiling-point, and the heat was used to run a low-pressure engine, operated by sulfur dioxid instead of steam.

Full Power Not Obtained

All of these devices were successful to a limited extent, but none was able to extract from sunlight anything like its full power. Instead of obtaining a horse-power, they were able to get only a thirtieth to a fiftieth as much, and were costly and cumbersome.

No one is prepared to say, however, that the problem is insurmountable. Indeed, it might be of the utmost importance to the welfare of mankind that it be solved. Sun-power some day may be called upon to replace the world's waning supplies of energy now represented by coal and oil.