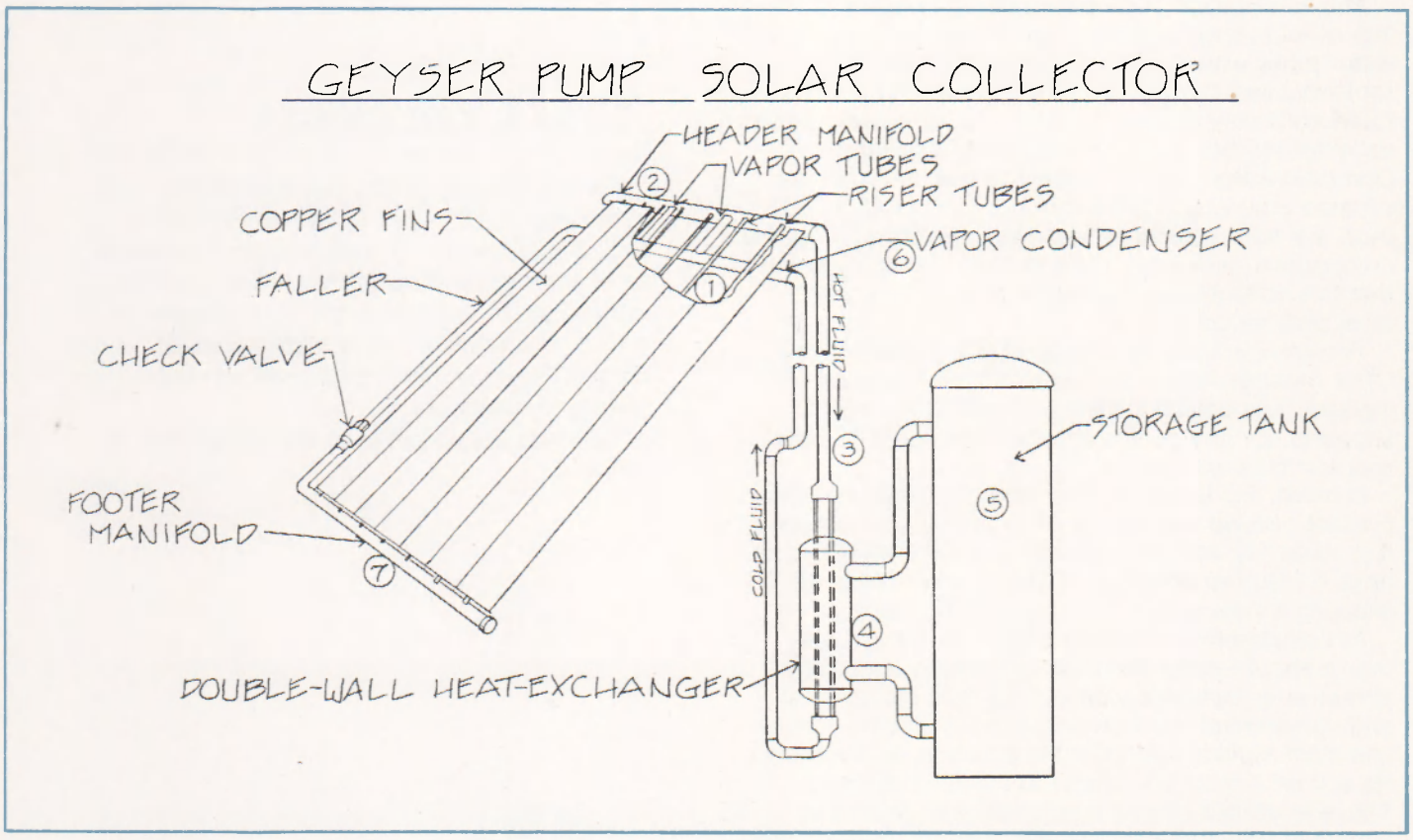
Geyser Pump Solar Collector

The Geyser Pump Solar Collector is a new passive collector which has the attributes of an active collector without the traditional problems of either type. It is a self-pumping, self-regulating solar collector, which, like active, employs a roof-top collector and a hot water storage tank downstairs. However, the Geyser Pump Principle used in the collector's design pumps the hot liquid from the collector down to the storage heat exchanger, using only the sun's energy. Both pumping and circulatory regulation are passive. The collector uses no electricity, no electronic sensors, no controllers, and no electric pumps or valves. The only moving part is a check valve.



What is this Geyser Pump Principle that powers the collector? The attached figure illustrates the collector's operation. Solar heating boils the liquid near the tops of the riser tubes **(1)**. Liquid is lifted out of the riser into the header **(2)** by the boiling, just as coffee is lifted into the basket of a percolator, or as a geyser forces water out of the Earth. Because the liquid level is lowered on the riser side and raised on the header side, liquid must flow through the loop **(3)** to equalize the two sides. But, in flowing from one side to the other, the hot liquid must pass through the heat exchanger **(4)**, where it gives up its heat to the storage tank **(5)**. The entire loop is evacuated, leaving only the liquid and its vapor in the system, so that the liquid can boil at a low temperature. Vapor produced by the boiling in the risers passes directly to the vapor condensor **(6)**, where the vapor comes into direct contact with the cool liquid returning from the storage heat exchanger. Recondensing the vapor in the cool liquid stream keeps the vacuum low and maintains the low boiling temperature. The connection between the vapor condensor and the footer manifold **(7)** contains the check valve and completes the hermetically sealed loop. The liquid presently in use is a water-alcohol solution which provides good freeze protection.

The Geyser Pump Solar Collector was invented in 1979. The development of five prototypes has been carried out at Sunrise Research, Inc. in Eugene, Oregon, U.S. The U.S. patent for the process has been granted and patents in other countries are being pursued.

The attribute of the Geyser Pump Solar Collector which gives it a strong position in the solar marketplace is its ability to deliver hot water to a downstairs storage tank with an efficiency (usable stored heat/insolation) matching that of the most efficient active collectors, but with none of actives' difficulties — failure of pumps, controllers, sensors, electrical service, and freezing.

This technology also eliminates a persistent problem of most passive collectors, namely, freezing of the water pipes which connect domestic water to the roof-mounted storage tank. The Geyser Pump Solar Collector's only connection from the downstairs to the collector on the roof is an antifreeze fluid loop. Domestic water lines in relation to this collector are situated downstairs at the storage tank location and thus, are not exposed to freezing conditions. In further comparison, testing by the company has indicated that this collector's efficiency is greater than that of most passive collectors.

The architectural advantage of this collector over other passives is that no heavy tanks are placed on the roof, just collector panels. No additional tank supports nor any cosmetic building facades to hide a roof-top tank are needed.

In short, the Geyser Pump Solar Collector matches present passive technology in simplicity and exceeds it in reliability and architectural esthetics. At the same time, it matches active technology in efficiency and exceeds it here also in simplicity and reliability.

Anticipated lower lifetime costs and low maintenance should make this new technology especially attractive to installers, contractors, and institutional and commercial users. Freedom from electric service and from replacement of motors, valves, and electronics will be a great advantage to remote site users. These attributes should be of particular benefit in locations where electric service and replacement parts are, at best, expensive and unreliable, and often unavailable at any price.

A 1985 marketing study of the Geyser Pump Solar Collector's desirability in the U.S., conducted by the University of Oregon, Eugene, Oregon, U.S. indicates that U.S. dealers and installers would welcome it on the market for its anticipated ease of installation, and low frequency and cost of repair or maintenance.

The testing of the Geyser Pump Solar Collector has progressed from proof-of-principle experiments and extensive computer simulation through prototype development and testing. To date, testing has guided design to the best configurations, demonstrated good thermal efficiencies, and shown that the collector performs well in a two-story installation. Company tests presently in progress include means for enhancing pump rate and thermal efficiency. Independent tests of its efficiency are being carried out by the engineering department of another major university.

It is believed that development of a manufacturable collector is essentially complete. Streamlining the design to accomplish manufacturing efficiency and cost effectiveness is expected to be completed shortly and so, make the collector commercially available from U.S. manufacturers by the beginning of 1986.

The Company

Sunrise Research, Inc. was founded in 1977 in Oregon as Bohemia Solar and Scientific, Inc., a Subchapter "S" corporation. In addition to marketing the Geyser Pump Collector, the company's long-range goals are on research and development of more applications of Geyser Pump technology as well as other innovative products.

Inquiries are welcome at the company's office at

Sunrise Research, Inc.
106 Alberta Lane
Eugene, OR 97404, U.S.A.
503-689-1614 1343·8344
Telex 910 459 2027EUG