

As Much Hot Water As Your Need Or The Sun In Trap

February 13 2006

A unique solar collector was developed by specialists of the Moscow “ALTEN” company under the guidance of Boris Kazandzhan, Professor, Doctor of Science (Engineering), Moscow Power Engineering Institute. Originality of the novelty lies in its extremely high efficiency. The collector not only manages to entrap the heat of solar beams falling on its surface, but also to utilize it to a great extent for direct purpose – for water heating.

Evidently, the idea of water heating in sunlight is not at all new. Water barrels painted black are installed on self-made showers perhaps at every country plots, allowing their owners to take a warm shower in summer. Alas, even in the hottest day, the temperature in the barrel is not too high, and there is no means for warming the house by radiators with the water heated in such an old-fashioned way.

The problem is that it is very difficult to catch solar energy and then to retain it. Habitual objects: a water barrel or a bench at the sunny side near the pond in the park do catch visible light energy and become warm – and immediately give a major part of this energy back into the ambient space, mainly in the form of infra-red radiation and convection.

To increase efficiency of absorption of solar energy and to reduce loss of heat, a special selective multi-layer coating based on titanium carbide is used. On the outside, it is dark as it should be to absorb light well. But its peculiarity is that having become warm, the coating almost does not radiate thermal energy. Thus, the coating allows to entrap solar energy in

the visible and near infra-red spectral region where more than 90 percent of solar energy is concentrated, and almost not to irradiate energy into the spectral regions corresponding to radiation of heat. The heat entrapped in such a way is collected by water that flows along copper tubes embedded into aluminium shapes covered by a selective coating and forming a so-called absorber. Instead of water, however, some other heat carrier may be used, but water is the cheapest of all.

To protect the reserved heat from being blown away by wind, in other words – to reduce loss of heat into the environment due to convection, the absorbers are inserted into special plastic casings. The casings are made of polycarbonate, which is not solid but cellular. The cells are hollow, that is why the air inside them is motionless, thus allowing to preserve the heat of water warmed by the Sun no worse than a good down-bed does. As for polycarbonate, it passes the light through very well, it does not get warm and does not cast shadow, so it does not impede the work.

As a result, during a sunny day, one collector of 2 square meters in area can heat approximately 150 liters of water up to the temperature of 60 to 70 degrees C. If necessary, water can be heated up to the boiling point. Several collectors can provide for hot water-supply and heating of a small cottage. Evidently, in the moderate climate, for instance, in the Moscow Region, it makes sense only during the “long” summer season since early spring till late autumn. In wintertime, one cannot survive only on solar heat, be the efficiency of such system even one hundred percent. However, in the mild European climate the system would serve all year round, to say nothing about warm areas. In near future, the first house with such heating will appear in the town of Sochi. Its front will be decorated with the ALTEN solar collector boards. The house will be provided with hot water the whole year round.

Source: Informnauka Agency

Citation: As Much Hot Water As Your Need Or The Sun In Trap (2006, February 13) retrieved 26 April 2024 from <https://phys.org/news/2006-02-hot-sun.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.