OVERVIEW OF THE MAIN TYPES OF SOLAR AIR HEATERS

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Abstract: *in recent years, the rapid development of the industry has led to excessive energy consumption and environmental degradation in the world. Already many countries are showing concern about the current situation. The way out of the current situation is considered many options such as energy conservation, the introduction and use of highly efficient installations and the widespread use of renewable energy sources. Among renewable energy sources, solar radiation is separated, its ecological purity. The simplest and most effective way of using solar radiation is to obtain direct heat. For this, solar collectors are used. The article compares the acceptance and disadvantages of solar air heaters with respect to water collectors. The basic elements, types and principle of operation of solar air heaters are considered. A literature review of solar air heaters has been conducted. And also the shortcomings of the basic solar air heaters are considered.*
Keywords: *energy, energy conservation, renewable energy sources, solar radiation, solar collectors, solar air heater, efficiency.*

ОБЗОР ОСНОВНЫХ ТИПОВ СОЛНЕЧНЫХ ВОЗДУХОНАГРЕВАТЕЛЕЙ

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Аннотация: *за последние годы бурное развитие индустрии привело к чрезмерному потреблению энергии и ухудшению экологической обстановки в мире. Уже многие страны проявляют озабоченность в связи с сложившейся обстановкой. Для выхода из сложившейся ситуации рассматриваются многие варианты, такие как энергосбережение, внедрение и использование высокоэффективных установок и широкое использование возобновляемых источников энергии. Среди возобновляемых источников энергии выделяется солнечная радиация, своей экологической чистотой. Самым простым и эффективным способом использования солнечной радиации является прямое получение полезного тепла. Для этого используются солнечные коллекторы. В статье сопоставлены преимущества и недостатки солнечных воздухонагревателей относительно водяных коллекторов. Рассмотрены основные элементы, типы и принцип работы солнечных воздухонагревателей. Проведен литературный обзор солнечных воздухонагревателей. А также рассмотрены недостатки основных солнечных воздухонагревателей.*
Ключевые слова: *энергия, энергосбережения, возобновляемые источники энергии, солнечная радиация, солнечные коллекторы, солнечный воздухонагреватель, эффективность.*

Annually for heating needs 30-35% of the total energy is consumed. Teaching that most of the violence live longer distances from the centralized heat supply, the transfer of the waste heat energy in heat electro centrals is not effective for transferring to greater distances. In tahih, the situation with the use of renewable energy sources (RES) is very effective. Among the installations working on the basis of RES, the solar collectors are cured with high efficiency.

When choosing solar heat supply, it is necessary to learn all the factors and compare the advantages and disadvantages of the system.

Disadvantages of solar heat supply system with liquid coolants:

- Freezing of the coolant in the cold season of the year;
- When heating the liquid, teach expansion and transition to a gaseous state;
- A large number of complete sets of items, numerous fasteners and the metal capacity of the system, leads to system cooling;
- Corrosion of the structure and the system as a whole;
- Leakage of liquid into the system;
- Expensiveness of the collector and the system as a whole;

- If there is a leakage of liquid, there is a danger of leakage of harmful substances.

Given the large-scale use and study of water solar collectors, it should be noted that low capital costs, low operating costs for pumping coolant, lack of corrosion, low repair costs allow us to consider solar air collectors as competitive compared to water. The scale of the use of solar collectors is given in [1].

Thermal conductivity, specific heat is 4 times less than the specific heat of water (at a temperature head between the heat-sending surface and air not exceeding 50 ° C), density, as a result of the complexity of accumulation is air deficiency as a heat-source compared to the heat-transfer liquids [2].

When solar radiation is the simplest converters, the energy of the sun's radiation into another form of useful energy, like heat, during the production cycle is the solar collectors, which have become widespread in various technological installations. Such collectors when receiving solar radiation perceive, transform and transmit this heat to the heat carrier for further use in technological processes. Basically, flat air collectors are used for air heating of buildings and drying of agricultural products [3].

Elements of the simplest solar air heater are (Fig. 1.1 g). The housing serves to collect heat 4, the transparent coating 2 with respect to the solar radiation passes the solar radiation inside the collector, protects the beam from the absorbing surface (absorber) from the external environment and reduces the heat loss from the front side of the collector. Absorber 3 absorbs solar radiation, converts into heat and transfers heat to the heat carrier. Thermal insulation 1 reduces heat losses from the rear and side surfaces of the collector [4].

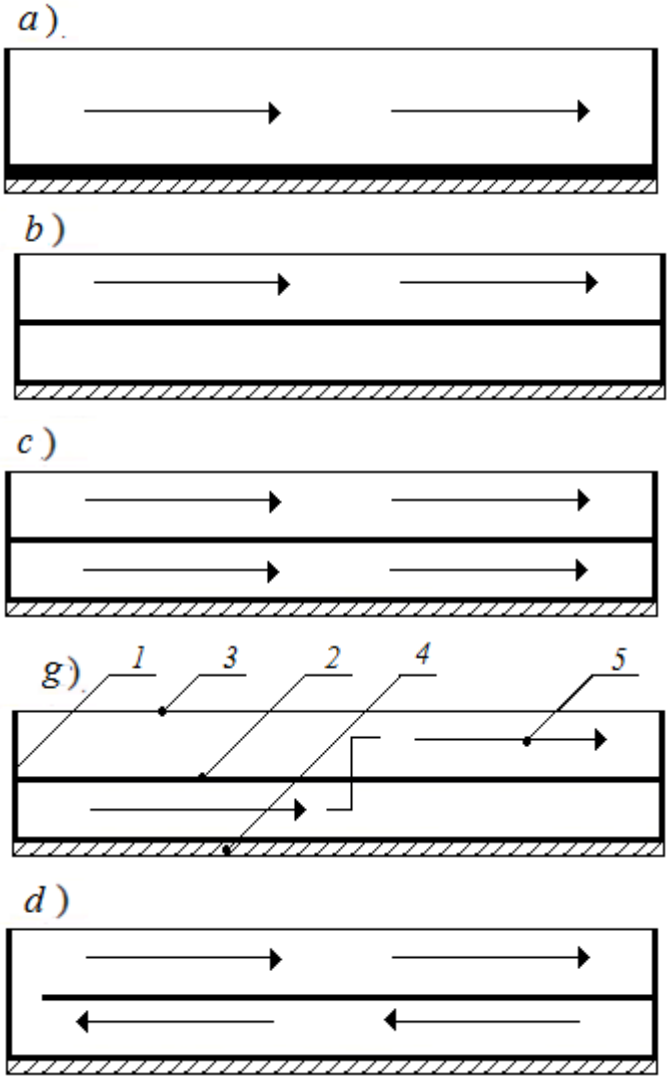

Fig. 1. Basic types and schematic diagram of a solar air collector: 1 - Thermal insulation, 2 - Absorber, 3-transparent coating, 4 - Housing, 5 - air flow.
a - Flux above the absorber, b - Flux under the absorber, c - Flux from both sides of the absorber, d - two-pass.

The principle of operation of the solar air collector is the following, most of the solar radiation incident on the collector is absorbed by the absorber, which is "black" in relation to solar radiation. Part of the absorbed energy is transferred to air circulating through the collector, and the rest is lost as a result of heat exchange with

the environment. The heat carried away by the coolant is a useful heat that either accumulates or is used to cover the demand [5].

In many of the simplest types of collectors, flat beams are used absorbing surfaces, usually blackened by the surface from the side of the salt from the metal sheet. In such collectors, the flow of heated air moves with laminar flow. Depending on the washing of the air flow of heat from the beam of the extinguishing surface of the structure, it can be divided into four types:

Flow over the absorber (Fig. 1.1a). The absorber lies directly on the thermal insulation, the air flow flows between the transparent coating and above the absorbers. The disadvantages of this design when heating the air are the highest temperature, the thermal losses increase both by convection and by radiation [6].

Flow under the absorber (Fig. 1.1b). This type of construction has an air channel between the absorber and the thermal insulation. Advantages of this design are the absence of contact between the heated airflow and the transparent coating, which significantly reduces the frontal convective heat losses.

Flow from both sides of the absorber (Fig.1.1c). It has two air channels, an air channel between the transparent coating and the absorber, an air channel between the absorber and thermal insulation. Airflow washes the absorber from two sides - the rear and the upper side. Due to this, the contact surface is increased by the absorber and the airflow [5].

The matrix absorber (Fig.1.1 g). Airflow with such an absorber passes through the absorber. The advantage of such absorbers is wider contact with the airflow, which leads to an increase in the efficiency of the collector as a whole.

Conclusion

As the speed of the airflow is increased, the efficiencies of the collectors in question drop sharply, due to the small contact surface between the absorber and the coolant and the absence of turbulent airflow. Thus, the above constructions are more appropriate for the natural circulation of air through the collector.

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