CHARACTERIZATION OF SOLAR DEVICES

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ABSTRACT

This article discusses the issues of identifying and classifying the most efficient options for a solar dryer, the study and analysis of different types of solar dryer appearances and performance processes.

Keywords: dryer, heater, research results, hot water, photovoltaic devices, solar devices, greenhouses, dryers, water purifiers, heaters.

The results of the research are widely used experimentally in various sectors and industries of the economy. For many years, the country has been developing and experimenting with hot water supply systems for homes and social facilities on the basis of solar water heaters. In Tashkent, Samarkand region and other regions, solar water heaters have been installed. Production of photovoltaic devices of different capacities has been mastered. Many universities and professional colleges are training qualified personnel in this field.

Solar devices are divided into two types: low-temperature and high-temperature solar devices. Low-temperature solar panels are widely used in the national economy. Low temperature solar devices include greenhouses, dryers, sprinklers, heaters. First of all, let's talk about dryers

Drying and storage of dried fruits, grapes and vegetables is one of the main problems in the processing of agricultural products. Drying of fruits is carried out in several ways:

1) air-solar method;
2) Drying method on fuel dryers.

There are also infrared dryers. Drying of fruits in solar dryers is carried out at the expense of solar energy. It is known that the fruit drying season coincides with the summer months, when there is a lot of solar energy. For example, in areas with a latitude of 40 °, 1 m2 of vertical surface receives 680 W / m2 in June, 800 W / m2 in July, and 760 W / m2 in August. Some of the solar dryers developed at Bukhara State University and Karshi State University are designed to grow vegetables during the winter months (SSO-3000) in order to increase their economic efficiency.

Solar dryers have the following advantages over air-solar (solar drying) and fuel-efficient dryers:

1) air-sun drying time is long, on the other hand, products are contaminated, insects are damaged, dust settles, and most importantly, some fruits, such as apples, have almost no vitamin C.

2) Fuel dryers burn certain	**time**									
	8	10	12	14	16	18	20	22	24	2
***T_1*, °C**	21,1	24,5	31,0	33,5	33,0	29,5	27,0	25,0	23,5	23,0
***T_2*, ^{0}C**	36,5	44,0	53,5	56,0	54,5	49,0	45,5	41,0	38,5	36,5
f-, %	42,0	38,0	32,0	30,5	31,5	53,0	38,0	40,5	41,0	42,5

The table shows changes in air temperature and relative humidity for the absence of a heat accumulator.

The simplest devices used to convert sunlight energy into heat energy are "hot box" type devices. So let's first look at the structure and operation of a hot box. A wooden box is taken and the bottom and side walls (sides) are filled with a material with poor thermal conductivity (wood chips, reeds, straw or any other material), in other words, thermal insulation 1 is carried out. Then cover the top of the thermal insulation under the box and the sides of the box with a black-painted tin 2 so that it does not shine. Let's install this device, which is formed by covering the top of the box with a window pane 3, perpendicular to sunlight (Figure 1.1).

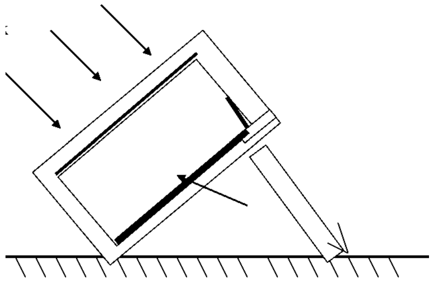

Figure 1.1. Schematic of the structure of the "hot box"

After a while, we observe the temperature inside the box with a thermometer (placed inside the box). The temperature of the air inside such devices, which are covered with a single layer of glass and have thermal insulation on the bottom and sides, can reach 70-75 ° C. Therefore, the simplest type of heat storage device is called a "hot box". The Swiss physicist Saussure first created the "hot box" in 1770. Since then, many "hot boxes" have been tested in different countries.

In Uzbekistan, K.G. Trofimov has been conducting research since 1928. K.G. Trofimov's research shows that as the number of glazed floors covered by a "hot box" increases, so does the temperature inside the box. For example, if the "hot box" is covered with 7 layers of glass, the air temperature will reach 200 ° C, and on the 8th floor - 225 ° C. As the number of glazed floors increases, leaving air between the glass layers, the heat loss through the glass decreases, but the heat loss from the bottom and side walls of the box increases. As the number of layers of glass increases, the amount of solar energy passing through each layer of glass decreases. Therefore, as the number of glazed floors increases, the useful effect of the device decreases, although the temperature inside the box increases. In Uzbekistan, it is enough to cover the "hot box" with a single layer of glass to get a temperature of 60-70 ° C in the summer. Solar "hot box" solar devices, which do not store solar energy, are the most common devices today. Such devices are commonly referred to as low-temperature solar devices. They are divided into the following types: 1. Solar water heaters;

2. Solar water filters;

3. Solar greenhouses and greenhouses;

4. Solar dryers;

5. Solar refrigerators.

The late scientist Kurban Boybotayev, who conducted research on solar technology in the country, classifies solar water heaters into the following types

1. Ordinary barrel-shaped heaters; 2. Tray heaters; 3. Zmeyevik (twisted tube) heaters; 4. Tubular heaters; 5. Flat, closed heaters [8].

Studies show that the most convenient of the above types of water heaters are tubular solar water heaters (Figure 1.2). Pipe water heaters have a layer of thermal insulation under the wooden box 1. The top of the thermal insulation 2 is covered with a black metal tunic boiler 3. Metal pipes 4 are laid in parallel ducts in boiler 3, large-diameter pipe-collectors are attached to both ends of the pipes by means of rubber pipes, and in smaller heaters the pipes are welded directly to the appropriate places of collectors. Smaller water heaters have a single-pane window, while larger (for example, 1m2) heaters usually have a double-glazed surface.

In Figure 1.2, B.V. According to Petukhov's design, the scheme of connecting the tubular water heater to the tank-accumulator (removable hot water tank) is shown. The cold water supply pipe 4 is connected to the bottom of the tank-accumulator 3, in addition the tank-accumulator is connected to the bottom collector pipe of the heater 1 using the bottom circulation pipe 2. The heater is attached to the collector pipe above. The collector pipe above the heater is also connected to the top of the accumulator tank via a circulation pipe.

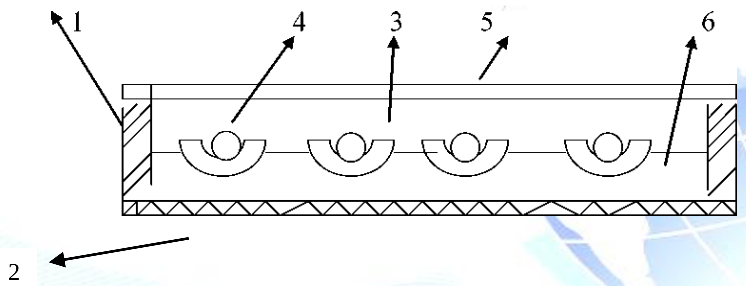

Figure 1.2. Schematic diagram of the structure of a tubular solar water heater

The heated water is discharged through the accumulator pipe 5 [11].

According to the research carried out in Tashkent, during the day in the summer during the day when the water is heated from 15 0C to 50 0C in a tubular water heater to 60 -70 l per 1 m2 of the heater, and when heated to 60 0C to 40 -50 l, when heated to 75 0C 20-30 up to l water was obtained. It is obvious that the amount of hot water received per 1 m2 of heaters per day decreases.

The amount of hot water heated per day per 1 m2 of the heater is called the efficiency of the heater.

This productivity:

1) the water heater can be rotated by the visible movement of the sun;

2) hot water, cold water and ambient temperature from the heater;

3) the design of the heater;

4) depends on the quality of work on the heater.

As in other areas of alternative energy sources, extensive research is being conducted in the field of solar drying of agricultural products. Although much research has been done, there are still unresolved issues. The advantage of solar dryers is that high-quality products can be obtained in a short time using alternative energy for drying agricultural products. Uzbekistan's economic development will be determined by the transition to market relations, the use of complex energy-saving technologies in the agro-industrial sector and the creation of their scientific basis. This master's dissertation is devoted to the problem of creating new variants of dryers using solar energy from alternative energy sources and conducting experiments on the optimal variant device.

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