

Improvement of Solar Dryers

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Abstract: for thousands of years, people have dried fruits and vegetables in the sun to preserve them for the winter. New technologies have led to a change in methods, but now the growing demand for healthy, inexpensive natural foods and the need for sustainable income are pushing solar drying to the forefront as a useful alternative to artificial food dryers.

Keywords: dried fruits, dryer, sun, economy, energy consumption, agriculture.

One of the options for using renewable energy sources for the development of entrepreneurship in the village is solar dryers.

For regions with a hot climate and many sunny days, this is just a find. Convenient and economical, they allow you to get environmentally friendly products with minimal costs.

When it comes to using solar energy for drying agricultural products for small farms and own economic needs, it is definitely about an economical solution. The technical and economic advantage of solar dryers, apparently, is more associated with reducing losses after harvesting than with ordinary energy savings. This, obviously, is the additional value that dried products in solar dryers receive, such as: uniform and high quality, compliance with phytosanitary requirements, the ability to place at acceptable prices (independence from market conditions), the possibility of higher earnings with a higher class of products, etc. .

Different products (fruits, greens) have different maximum allowable drying temperatures. The air temperature for drying should not exceed the maximum permissible value, and this is achieved by adjusting the length of the solar manifold (for a tunnel dryer) or air flow through the number of operating fans. Various concepts of the use of the sun for drying purposes allow you to develop an implementation, technologically simple and reliable system that the masters in small farms could reproduce, using mainly local materials to get the greatest effect from dried fruits.

In addition to the attitudes considered, you can also use the shutter dryers that can be used for large production of dried fruits and fruit pastilles. The solar drying of the cell is a structure - a room with transparent walls (except northern) and a ceiling.

Such premises in winter are used as greenhouses, and in the summer they work as dryers. To move from the drying regime to the greenhouse and vice versa, in such installations it is necessary to perform the necessary actions that change the operating mode of the room. In order for fruits to not lose their commodity type and taste, such dryers use filters to protect products from ultraviolet radiation.

We are proposed solar dryer intended for drying vegetables, fruits, mushrooms.

The solar dryer is made in such a way that the maximum absorption of solar radiation is available throughout the day. This was made possible due to the fact that each part of the dryer (the eastern side of the dryer, the western side of the dryer, the main copper absorber and the door) is absorbing. Each of these parts is painted with a selective dye, which has 85% absorption and 15% radiation of solar radiation. The whole dryer is a polycarbonate shell that prevents direct contact of the dried product. The protective coating does not allow heat to get out of the dryer and protects the products from any external harmful effects.

It consists of a case with two independent drying compartments, two reserve heating panels, fans, a photoelectric panel and removable pallets.

The pallets are designed to accommodate products prepared for drying. The measurement panel is designed to power fans, through which forced ventilation of heated air in the drying chamber is carried out, which contributes to a faster removal of moisture from the product.

In the absence of solar radiation (with cloudy weather or at night), air heating and fan power can be carried out from the backup heating panel by connecting it to the 220V network.

The solar dryer is equipped with a battery, which provides ventilation in the drying zone at night to prevent damage to products.

Main characteristics:

- pallet size 0.6*0.5m;

- number of pallets 59 pcs;
- Circulation - 12 fans 12V, 1450 RID/min;
- main power - photoelectric panel 50W;
- reserve power - from the 220V network, power 2*1500W;
- Accessant - 40 Ah, lithium -ion;
- overall dimensions- 2.4*1.75*1.95m;
- Moisture -resistant cover to preserve the dryer in the winter!

Advantages of solar dryer:

- Dry fruits and vegetables, smoking from March to October (at a temperature of at least +20 +25 °C);
- reserve nutrition allows you to dry in rainy and cloudy weather;
- simultaneous loading up to 95 kilograms of products;
- the presence of two independent sections allows you to dry 2 different products at the same time;
- preservation of taste, color and benefits of the product;
- accelerated drying of products;
- protection against rodents, insects, birds;
- protection against dust and precipitation;
- Reducing the area required for drying by 45 times!



In the past, the products were preserved exclusively by drying in the sun (outdoors). With the development of technology, other, more modern methods using other sources of energy have appeared. However, energy consumption when using traditional techniques is quite high. In general, professional drying includes a long chain of operations covering the cultivation/organization of raw materials, storing fruits before drying, cleaning fruits in hygiene conditions, treating fruit waste, dried fruit, storage of fruit before sending and selling the product.

Pros of solar dryers: Traditionally, drying of fruits, vegetables and herbs is produced in energy - intensive drying plants (dehydrators) that consume a large amount of energy, or simply on even surfaces under the straight rays of the sun.

Thus, the considered drying devices help to improve the drying process of dried fruits and lead to high effective drying technologies.

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