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Infrared Drying Plant For Fruit Vegetables

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ABSTRACT: This report describes the features of the installation for drying fruits and vegetables on the basis of functional ceramics emits pulsed infrared radiation and given the prospects for their use.

KEYWORDS: infrared radiation, functional ceramics, quartz lamps, evaporation.

I. INTRODUCTION

According to modern requirements, at present the national economy needs facilities for drying agricultural products characterized by high operating parameters, low cost and material intensity. In recent years, it has been possible to develop technologies for the production of functional ceramics, which transforms the continuous radiation of a primary source into pulsed infrared (IR) radiation and their wide use in various areas of the national economy [1].

II. GEO SCATTERED TYPE BIG DATA IN APPLICATION

Developed special functional ceramics, the use of which in the drying process can significantly improve the efficiency of the process while reducing the drying time, and also ensures the high quality of the final target product. Ceramic materials of the calculated composition were synthesized by melting in the Large Solar Furnace [2]. The resulting fused ceramic was ground into a powder with grain sizes of 1-10 μm (мкм) and using a binding additive, a surface of quartz tubes was placed, inside which a nichrome spiral was placed. The thickness of the ceramic layer was ~ 20-40 μm (мкм). Based on the described ceramic emitters, an installation has been designed, a schematic view of which is shown in Fig-1.

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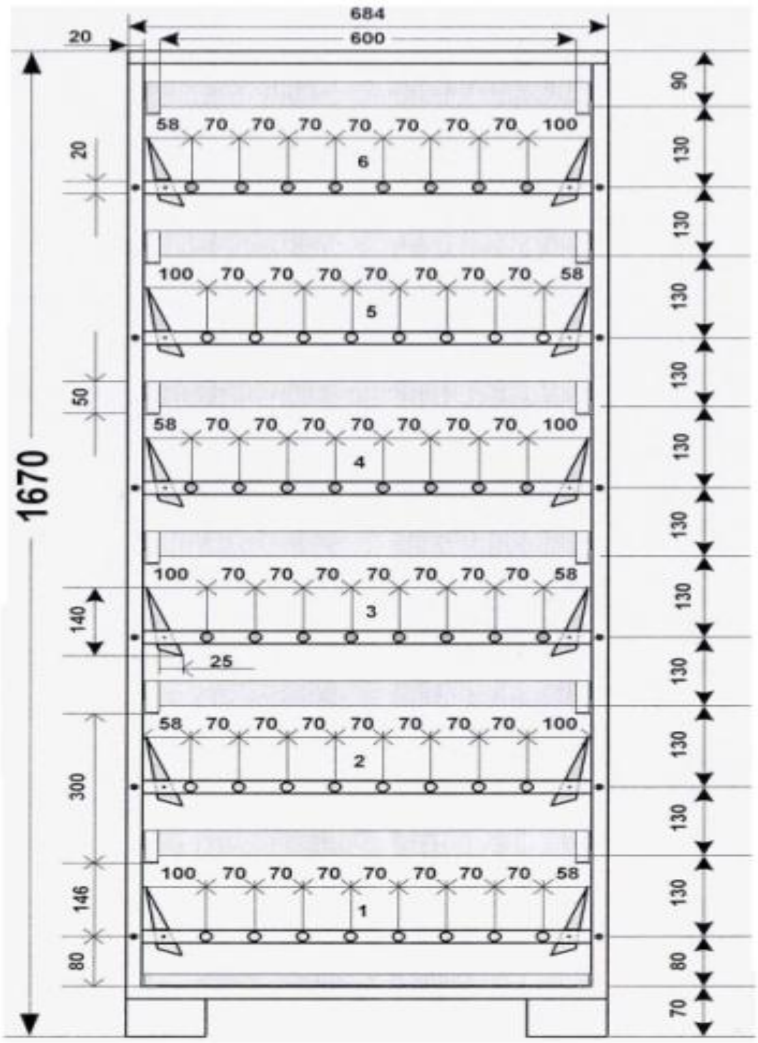

One of the main features in the case of cabinet drying is the problem of evacuation of steam formed during the evaporation of the solvent, in particular, water. Steam is retained in the working volume, absorbs most of the energy of the emitters. This leads to overheating of the product, which not only reduces energy efficiency, but also greatly degrades the quality of the target product, as the product begins to heat up under the influence of superheated steam. It becomes dark, non-uniformly dried. Ejectors were used to eliminate this process. In this case, the steam is removed due to ejection.

The advantage of this system is that it can be used for drying installations of any size and does not require radical processing of the structure in this case. In fact, a pump is created in the channel between the ejector and the device wall, which intensively removes moisture from the products due to excess heat and does not require additional energy expenditure for forced ventilation of the camera.

The correct choice is the correct choice of the number and location of the emitters. The optimal scheme is when the radiators are arranged in staggered order in order to create a maximum uniform irradiation zone under illumination from below and from above (see Fig. 1). The number of radiators and the height of their location is chosen proceeding from the fact that an equilateral triangle with vertices of two radiators is constructed and the point of maximum pallet loading is for the upper radiators, and for the lower radiators this vertex is located on two trays.

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Later this principle was also used to calculate drying devices of large dimensions. The angle of inclination of the ejector and its shape are selected from the condition that the projection of the lower part of the ejector should overlap the middle of the pan. At the same time, it is unacceptable for the ejector to block the path of the rays to the product, since this reduces the efficiency of the system. In this case, the maximum efficiency of steam extraction and the use of energy supplied is ensured.

A significant influence on the parameters of the drying device is provided by the distribution of capacities along the shelves in the multi-shelf system. Other things being equal, the best effect is achieved with the increased power of the lowest group by 15-25%. This is explained by the fact that the incoming air (from below) is colder than in the subsequent layers. As the product dries, the amount of water in it is not reduced and at a constant power of evaporating moisture it may not be enough to remove excess heat. Therefore, in these dryers a special regime has been introduced, which makes it possible to reduce the power by half and to go into the so-called "regime before drying".

There is a more effective way to solve the problem of increasing the performance of the installation. The fact that the products when drying are significantly reduced by both mass and volume. In this regard, after reducing the total weight by 3-4 times, the products from the upper shelves can be poured onto the bottom, then the thickness of the layer will be sufficient to allocate the necessary amount of moisture for cooling.

The freed upper shelves are loaded with fresh produce. This approach is particularly advantageous when using relatively large installations, for example, by farmers. It is as if an uninterrupted regime. For many conveyor dryers, the speed of the belt moving the product to the lower layers slows down, which leads to the accumulation of thicker layers of the product, sufficient moisture is released for cooling, and it becomes possible to obtain high-quality products.

We give the results of a study on drying fruits using a drying cabinet as outlined by the construction [3] (Fig. 2).

III. RESULTS

The resulting product is distinguished by its good commercial appearance and preservation of all useful elements up to 90% of the original ones.

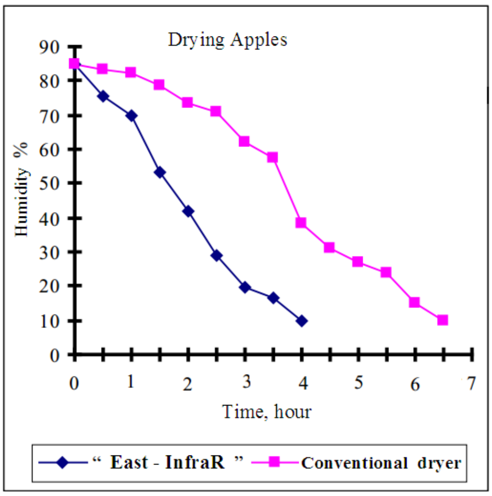

Fig.2. Dynamics of drying apples

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VI. CONCLUSION

Functional severity impulsive infrared radiation with a specific spectrum was obtained. As a result, the results of qualitative and environmentally friendly drying of agricultural products were achieved.

REFERENCES

1. Lykov A.V. The theory of drying. -M .: Energy, 1968.
2. Rakhimov R.Kh., Saidov M.S., Ermakov V.P. Features of synthesis of functional ceramics with a set of specified properties by the radiation method. Part 5. The mechanism of pulse generation by functional ceramics. Computational nanotechnology release. -M .: №3, 2016.
3. Rakhimov R.Kh., Ermakov VP, Rakhimov M.R., Latipov RN Features of synthesis of functional ceramics with a set of specified properties by the radiation method. Part 6. Computational nanotechnology release. -M: №3, 2016.

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