



## CONVEYOR DRYING DEVICE FOR DRYING COCOON PRODUCTS

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### Abstract

If we pay attention to the relevance of the article "conveyor dryer" in the drying of cocoon products, today the issue of drying, which is a method of high-quality and long-term storage of silkworm cocoons before processing, is considered. A solution to the problem of obtaining the quality of the product being dried and complete inanimation of silkworm cocoons is given.

**Keywords:** Cocoon products, silkworm, drying, drying devices, solar drying, special drying devices, quality of silk fiber, quality of cocoon in drying, moisture, thermal energy, solar radiation, conveyor.

### Theoretical Part

It is known that its quality plays an important role in the drying of coir products and the processing of dried products. Many achievements and experiences have been achieved in this regard. However, scientific research is being conducted in this regard. The need to obtain high quality silk fiber from silkworm rearing and processing of cocoon products imposes many responsibilities and tasks on this industry.[1]

Synthetic fiber products do not cost much to produce compared to natural fiber products. A lot of work is done to grow and process natural fiber products. Therefore, this process requires the development and implementation of energy-saving technologies in the field. The complete drying of the product in the used technologies makes it possible to store it for a longer period of time and is considered a positive indicator by silk quality indicators.

For example, in order to redevelop a silk product, it is necessary to remove moisture from it to a moderate level (until 10-12% remains). Depending on the product being dried, one kilogram of product will contain different percentages of moisture. In the process of drying coir products, a lot of energy is consumed today.





Depending on the devices and drying methods used in the drying of cocoon products, they are mainly divided into the following types.[3]

- 1- Convective drying is done by direct contact of the product being dried with the drying agent;
- 2- By spreading in shady areas;
- 3- Radiant drying - by transferring heat through infrared rays;
- 4- Dielectric drying - by heating in the field of high-frequency currents.

Among these methods, drying with the help of separate solar energy can be included. But drying of solar energy through special devices is included in the 1st method of the listed methods. The 4th method is rarely used for drying. However, it is used to kill silkworm cocoons. Each of them has its advantages and disadvantages. The advantage of fuel-based dryers is that they provide high productivity and allow for industrial use. The disadvantage is that it is expensive and requires a lot of energy. In the natural and climatic conditions of our country, the use of devices working on the basis of solar energy is promising for solving the scientific and technical problems under consideration. Saving fuel and energy resources, ecological cleanliness of production, favorable natural and climatic conditions are among the advantages of these devices. In particular, the process of drying cocoons from silkworms and killing sponges corresponds to the most active period of solar radiation. However, the use of such devices depends on the weather and whether the day is sunny. As a result, the drying process is prolonged and efficiency decreases when there is no sunlight (at night or when the weather is cloudy). But in this regard, a solution can be made and continuous drying can be done through additional electricity.[3] the process of drying cocoons obtained from silkworms and killing sponges corresponds to the most active period of solar radiation. However, the use of such devices depends on the weather and whether the day is sunny. As a result, the drying process is prolonged and efficiency decreases when there is no sunlight (at night or when the weather is cloudy). But in this regard, a solution can be made and continuous drying can be done through additional electricity.[3] the process of drying cocoons obtained from silkworms and killing sponges corresponds to the most active period of solar radiation. However, the use of such devices depends on the weather and whether the day is sunny. As a result, the drying process is prolonged and efficiency decreases when there is no sunlight (at night or when the weather is cloudy). But in this regard, a solution can be made and continuous drying can be done through additional electricity.[3]





**Style.**In this regard, the "drying device" offered by us has the possibility of continuous operation and in the process of drying Pilla products, it completely dries it along its entire size and brings the level of dryness in each product to equality. That is, the product dries at the same level.[4]

The general appearance of the device is clearly shown in the diagram and picture below.

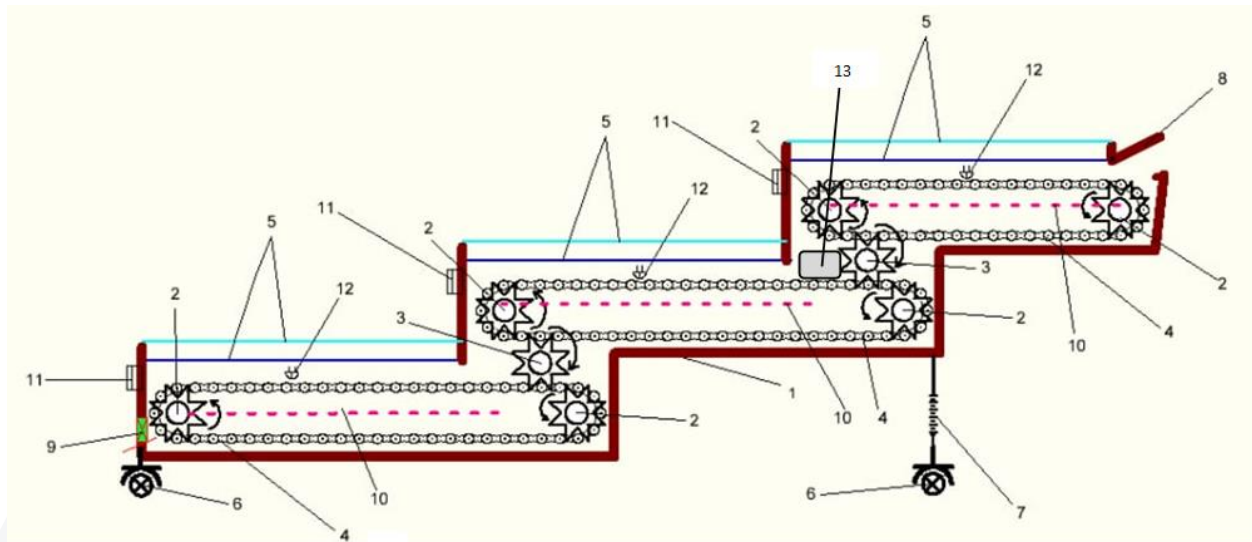


Figure 1. Schematic overview of the device

1. Heat insulating case
- 2 guide wheels
- 3-drive wheels
- 4th conveyor, chain
- 5-sunlight glass and heating black body (collector)
- 6-horizontal and vertical 360\* rotating support
- Subject matter for adjusting the angle of sunlight incident on the device 7
- 8th product entry point
- 9-the area that releases the dried product through automatic opening
- 10-electrical heating element
- 11-automatic ventilation system
- 12-humidity and temperature sensors
- 13-Mechatronic system management.



This theoretical scheme resulted in the following clear view of the device.



Figure 2. Overview of the device.

Advantages of the completed work over other devices, achievements, scientific innovation not used before.. we can say that these mentioned terms are the essence and core of this scientific work.

As mentioned above, one of the important innovations of this idea is the complete drying of the product. This is achieved by drying the product on both sides. Three conveyors are used in the device to dry the product on both sides. On the first conveyor, the desired dried product is transferred to the second conveyor by conveyor movement. As a result of this transfer, the product is turned over, and as a result, its second side is also dried. During the beginning of the working process of the device, only the product is picked on the first conveyor. After drying for a certain period, it is transferred to the second conveyor through the conveyor, while new products are added to the first conveyor. As a result of this process reversal, the product on the second conveyor is transferred to the third conveyor. When the process is repeated again, the third one is removed from the conveyor. The process is repeated in the same way. Another advantage of this innovation is that all conveyors are driven by one mechanism. [5]

Practical experiments were conducted using the created device. The process of killing and drying silkworm cocoons was observed.



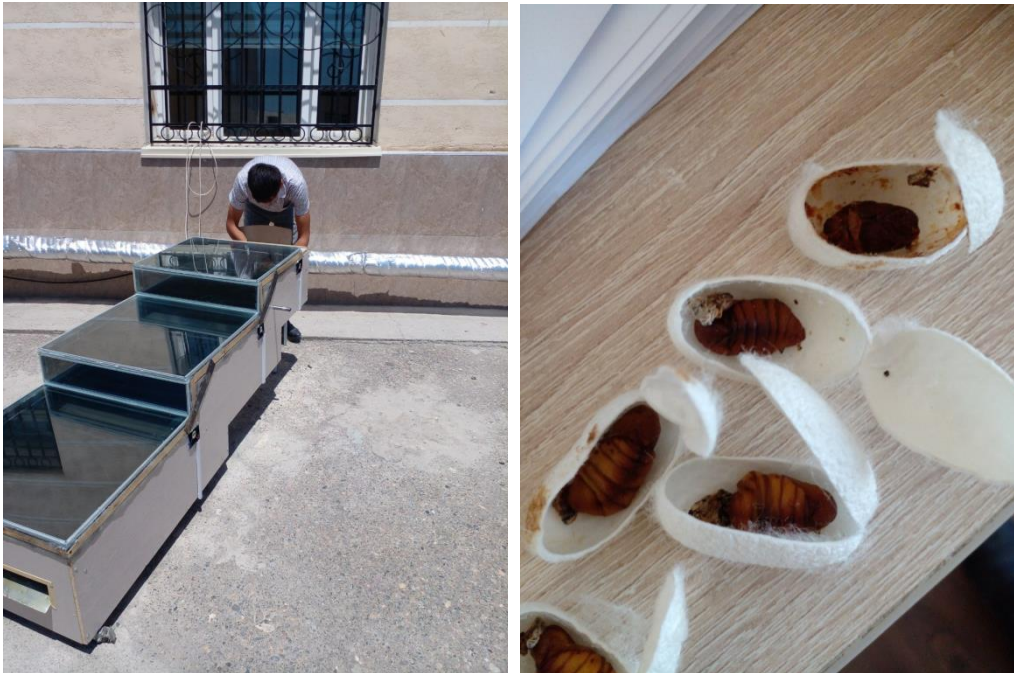


Figure 3. The process of killing and drying silkworm cocoons and its resulting sample.

The goal is to increase the quality of drying by implementing innovative technologies, to solve quality issues related to moisture with a positive approach, and to partially solve the problem of energy shortage, which is one of the global problems, through this energy-efficient device.

As for the method of solving the problem presented in the article, it is assumed that the product will be dried through moving conveyors arranged in a row. The energy used to dry the cocoon and kill the silkworm cocoons, solar and electrical energy are counted.

**The result** in the day and night drying of the product, two-way drying of the product, reduction of the time spent on it, reduction of the amount of unit energy spent on one kilogram of the product being dried, and quality drying of the product due to the use of the mechatronic system were achieved.

Implementation of these and similar small technologies leads to the appearance of certain advantages in human activity.

**Summary** in other words, by implementing this device, which is shown as a solution to the problems in the silk industry, we will serve to solve a number of tasks facing humanity. A number of experiments were conducted on the device and theoretical and practical scientific analyzes were obtained. The use of the device can be considered a



breakthrough in cocoon drying and silk quality assurance. Because these situations were observed through the results of practical experiments.

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