OPTIMIZATION OF WORKING PARAMETERS OF NEW SOLAR AIR HEATERS

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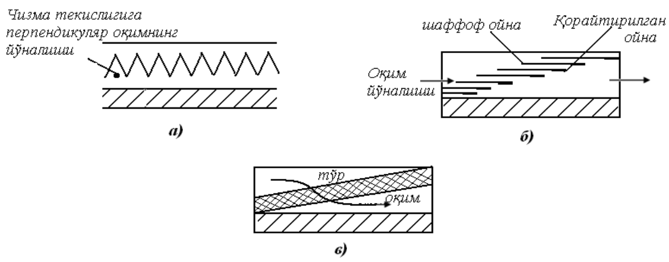
Annotation: *This article considers the issues of accelerating heat exchange processes in the use of a solar air heater device with a submersible air pipe absorber.*

Key words: *Solar air collector, absorber, temperature, convective heat discharge, bottom pipe, Reynolds number, laminar, turbulent.*

Today, many researchers and scientists are conducting scientific research on the issues of introducing equipment into the Heat Supply System in the field of advanced technologies, where energy and fuel and energy resources can be used efficiently and economically. It is known that the natural fuel, energy resources used today on an industrial scale, are sharply decreasing for this reason, the use of renewable energy sources makes it possible to preserve natural resources and the ecological situation in the existing Line [1] since in the 21st century the world has faced two serious problems in the energy sector: ensuring reliable energy supply and combating climate change. Developing environmental problems, on the one hand, the extremely unstable market of energy sources, on the other hand, the risks of the energy supply system, if it is built solely on the basis of the use of fuel, considering the resource on which any type of resource ends, this can lead to serious problems associated with energy resers in the Future [2].



Only about two billion of the energy distributed by the sun to Earth

In a study of the literature, it can be noted from the result that the rate of convective heat transfer can be increased by increasing the heat transfer surfaces exposed to air flow, or by increasing the coefficient of convective heat transfer from the heated surface. It is necessary to establish an optimal turbulent flow regime in order to increase the thermal conductivity and, accordingly, reduce the dimensions of solar air heaters, its mass, or increase its thermal power in previous measurements and increase the thermal efficiency through the air flow from the radiation-absorbing surface. (Figure 1) this task is carried out by applying artificial thunderstorm, profiling the surface of the solar beam receiver, placing recesses or gaps on the surface of the beam receiver.

Figure 1. High efficiency solar air collector types.

a – triangular-channel surface;b – perforated surface; v – full.

A model of flat-tube flat-sun air heater was developed the length of the device is l=800 mm, the width is a=400 mm, the height is h=62 mm. Bulging metal channels with a triangular shape were installed in the working Chamber of this solar air heater. The length of each channel is l=150 mm. The intermediate distance of the two bases of the air duct is l=60 mm, the height of the bases of the duct is h=60 mm. Each base side of the air ducts is given two rows of inner convex geometric shapes, the depth of this shape is h=2 mm and the width is l=15 mm. The geometric shape given to the Collector's air ducts is the opposite to the inner surface of the duct in an internal convex position relative to the outer surface of the duct. In a solar air heater, when used by spraying air, the inlet and outlet pipes are jouled, giving d = 15 mm. The device works in a two-way way.

- Air spray
- Sucking air

When spraying air, input and output pipes are used along the diaganate of the device.

In the case of air Absorption, however, air inlet channels are used, each channel in a separate order to itself.

The channel layout is in chess view and covers the collector to the full extent of all the air flow passing through the surface of the common working camera.

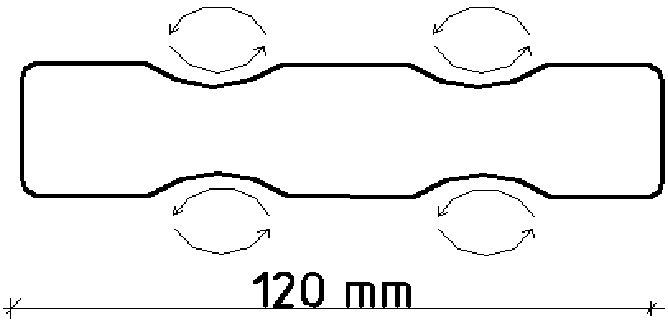


Figure 2a. Air pipeline.

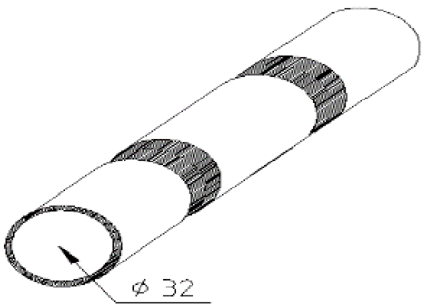


Figure 2b. Air pipeline.

In tubular solar air heaters, a largely kenvective heat exchange process occurs.

On the surface of the opposite part of the solar air heater pipe, a boundary layer is formed, the thickness of which increases along the direction of flow. At some points, a superficial extension of the boundary layer is observed, and two symmetrical grooves appear behind the pipe.

The position of the break point of the boundary layer will depend on the number of Re. When the Re number is not very large and the turbulence level of the current coming into the pipe is small, a boundary layer is observed to be disconnected at 82 - 84 e.g. As the number of Re increases, the movement in the boundary layer changes to a turbulent form. As a result of this, due to the increase in kinetic energy, the break-off position of the boundary layer is shifted downwards along the stream (φ≈120÷140°), which leads to a decrease in the heap zone behind the pipe and an improvement in coverage. α_φ α φ (φ=0°)

Such specific coverage of the pipe affects the heat exchange between the airflow and the pipe surface.

Figure 4 (B) describes the ratio of the local heat-giving α_φ of the medium heat-giving α of the heat-giving φ of the heat-giving ratio of the heat-giving ratio of the heat-giving ratio of the (φ=0°). As can be seen from the picture, The Giving of heat takes place intensively on the pipe (in the case of the (φ=0°) thumbs up), the φ=90°÷100°thumbs up, the thumbs φ=120° thumbs up at 120 thumbs up and then the thumbs down again at φ=140° thumbs up. The decrease in heat dissipation in the part of the pipe φ=0÷100° due to an increase in the thickness of the laminar boundary layer

$$Re = \frac{vd}{\nu} \qquad (10)$$

Here is v-speed, $d-$diameter, ν -kinematic viscosity of air. The dynamic viscosity of air is determined by the following formula.

Table.3 Reynolds number versus speed

Re	5111	6766	8271	9559	9993
V m/s	3.77	4.99	6.1	7.05	7.37

Experiments were carried out using a solar air heater with a bottom pipe. The performance efficiency of the solar air collector is directly related to the Re number, and the Reynolds number is found as follows.

Conclusion: It is required to carry out experiments at all times of the year using a solar air missionary developed in a new way, as well as to develop a mathematical model of the device based on the results obtained.

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