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BALANCE OF TEMPERATURE IN SOLAR COLLECTORS BY AERODYNAMIC METHODS

Tokhliyev Mansur Mahmudovich
Karshi Engineering Economics Institute
Assistant lecturer, Department of General Physics
tokhliev@mail.ru

Bobilov Nodir Kholturayevich
Karshi Engineering Economics Institute
Assistant lecturer, Department of General Physics
bobilovnodir@gmail.com

Annatatsiya. Ayni vaqtdagi Quyosh kollektorlarida tashqi temperatura $+10^0$ ..... $+15^0$S gacha bo'lganda kollektorlar o'ziga yetarli issiqlik energiyasini to'play olmaydi. Shuning uchun mavsumiy kollektorlarni yaratish kerak. Quyosh kollektorlarini samaradorligini oshirish orqali quritish shkaflaridagi meva va sabzavotlarni tez va sifatli quritib olish imkoniyati mavjud bo'ladi. Kollektorlar asosan o'ziga tushgan issiqlik energiyasini uzoq muddat davomida saqlab turishi kerak.

Аннотация. В существующих солнечных коллекторах при температуре наружного воздуха $+10^0$ ..... $+15^0$ градусов коллекторы не могут накапливать достаточно тепловой энергии. Поэтому необходимо создавать сезонные коллекторы. Повышая эффективность солнечных коллекторов, можно будет сушить фрукты и овощи в сушильных шкафах быстро и эффективно. Коллекторы должны надолго сохранять получаемое тепло.

Abstract: At present solar collectors, when the outside temperature is + 10 ^{0}C.... + 15^0 C degrees, the collectors cannot store enough heat energy. It is therefore necessary to create seasonal collectors. By increasing the efficiency of solar collectors, it will be possible to dry fruits and vegetables in drying cabinets quickly and efficiently.Collectors need to retain the heat they receive for a long time.

Kalit so'zlar: Kollektor gelioquritgich,aerodinamika,qoraga bo'yalgan toshlar,qoraga bo'yalgan bakalashkalar, temperatura, gradus, konvektivli quritish shkaf, quritgich.

Ключевые слова: Коллекторная солнечная сушилка, аеродинамика, камни, окрашенные в черный цвет, ракушки окрашены в черный цвет. температура, градус, конвективный, шкаф, сушилка.

Key words: Solar collector dryer, aerodynamics, stones painted black, shells painted black. temperature, degree, convective, cabinet, dryer.

Introduction. Solar energy, which is the main source of renewable energy in Uzbekistan, is one of the leading renewable energy sources. This means that this type of energy can be widely used in various sectors of the economy. Wet fruits can be stored in separate conditions for 5-6 months. The quality of such stored fruits, vegetables and grapes decreases, the physical weight decreases. That is why it is important to dry the fruit. In our country, the luminosity of the sun throughout the

year is 270-300 days, and the maximum power of solar radiation per square meter of surface placed perpendicular to the sun's rays reaches 1 kW. During the year, the total amount of solar energy per square meter of the horizontal surface of the territory of the Republic is 1650-1750 kWh, which is equal to the heat energy released during the combustion of 140-150 kg of petroleum fuel[1].

Literature revew. There are natural and artificial methods of drying agricultural products. While the natural methods are air-dried and solar-powered (solar drying), there are many methods of artificial drying. These include convective, infrared, conductive, acoustic waves, and vacuum drying. One of the most common methods today is the convective method of drying products. This method is done by transferring the heat energy of the heated air to the product being dried. Drying of products is carried out by the energy transferred to them, evaporating the moisture in them and removing them by heat. This method is implemented in tunnel, chamber, turbine, belt, drum and shaft devices. The quality of products dried by this method does not differ from the products obtained by sublimation. Dried fruits and plants soaked in liquid quickly and completely return to their original state. The smell, taste, color and vitamins of raw products are maximally preserved during the drying process.

Currently, the demand for seasonal convective solar collectors is high because convective solar collectors cannot provide enough heat energy to the drying cabinet due to heavy rainfall in autumn and spring. The recommended solar collector provides sufficient heat to the drying cabinet for efficient operation in all seasons. Materials needed to make a convective solar collector;

1. Sharp stones painted black (black moth).
2. Polycarbonate or transparent keel, glass.
3. The wooden rack is 4 × 4.5 cm thick.
4. Glass wool.
5. Black water-filled cans.
6. Twist mix.
7. Pipe.

Research Methodology. The advantage of the collector is that it retains the energy absorbed and absorbed for a long time. Depending on the season, black painted stones or black bottles filled with water are placed. For example, in the summer months, more heat-retaining materials are placed inside the collector, because the daytime heat is hot, so the drying cabinet has enough heat energy. Excess solar energy entering the collector is stored by the black stone and water-filled shells inside the collector. Due to the cooling of the heated collector, the fruit inside the cupboard continues to dry even at night. Due to the long drying time, it is possible to dry more fruits in less time [1]. In winter, the collector should not contain substances and materials that absorb solar heat. not enough heat is provided. Collectors built on soil or concrete absorb most of the heat they receive. This reduces the efficiency of the collectors. To prevent this, the lower part of the collector should be covered with one or two layers of fiberglass with poor thermal conductivity. In order to keep the hot stones inside the collector warm for a long time, racks of the required length with a thickness of 4 × 4.5 cm are placed on the glass parallel to the size of the black-

painted stones, and large black stones are collected first. As a result, the heat energy of the heated stones does not pass to the concrete or the ground. To place the stones in the collector in an orderly manner, the stones should not fall between the parallel wooden racks. Air aerodynamics are also taken into account in the solar collector. The air from the openings in the front of the collector reaches the drying cabinet in three different ways.

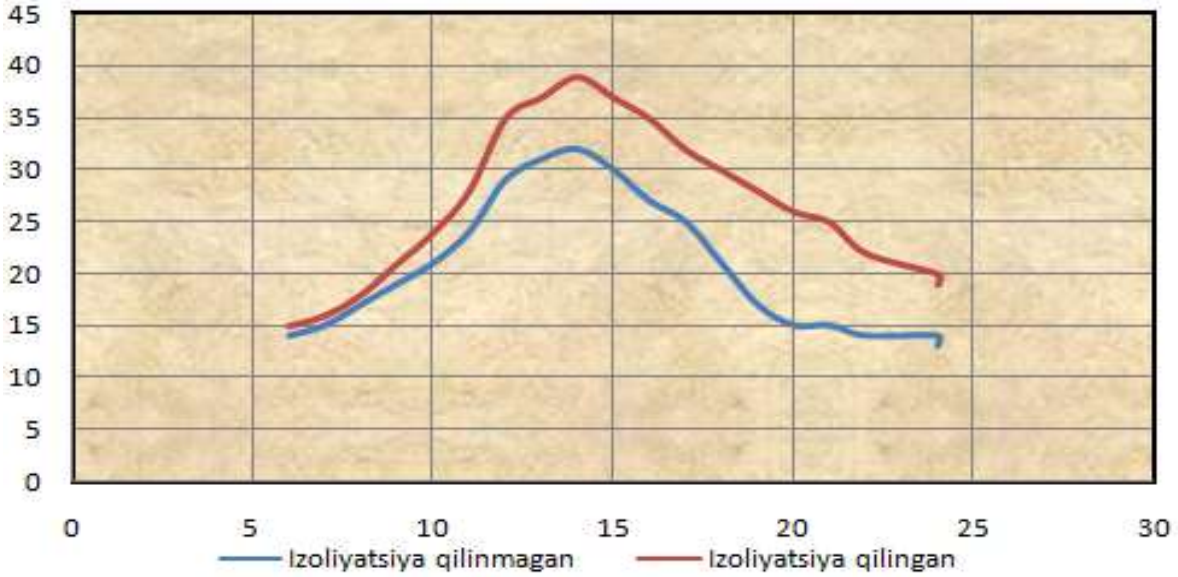
Analysis and results.

1. Between the stones through the pipes: through the pipes (metal pipe) placed between the stones, the air velocity increases and the heat moves towards the cabinet.

2. By parallel wooden racks: in the evening, when the outside temperature drops, it is possible to transfer the heat energy under the hot stones from the parallel wooden racks to the cabinet by convection.

3.The stones, between the shells: the air that enters the collector through the hole, the hot stones, the hot air that passes through the hot shells and goes to the convection drying cabinet.

As a result, it is possible to maintain the temperature in the drying cabinet at 50^0- 60^0 C for a longer period of time. The results show that the heat retention times



for 24 hours with thermally insulated, aerodynamically operated collector, and thermally insulated and non-aerodynamically collected collectors are shown in the following graph. The graph shows the temperature on the Y axis from 0^0…. $+45^0$degrees. 0-30 hours on the X axis.

$$cosi = Q_{nur} + Q_{kon} + Q_{AB} + Q_B = C\left[\left(\frac{T}{100}\right) - \left(\frac{T^u}{100}\right)\right] + \propto (t_1 - t_0) + Q_{AB} + Q_B$$ (1) Here $\propto$ is the heat transfer coefficient, $\propto$ = 5.7 + 3.8th, there is the air velocity [2]. (1) formula for the heat exchange air velocity inside the collector indicates that If the air aerodynamics inside the collector is not good, if there is no possibility to control the air velocity inside, the heated air does not reach the drying cabinet well, so the fruit inside the cabinet does not dry well [3]. By the aerodynamic method inside the collector, wind flow occurs at different temperatures at three different speeds. Moisture in the fruit does not evaporate quickly, it takes a long time for the fruit to dry. It should be noted that when making collectors, the device itself should not absorb heat inside the collector. The efficiency of our recommended collector is close to the efficiency of the vacuum collector. In the construction of solar collectors, physicists Joseph Stefan, Ludwig Bolsman, Reley-Gins, Fure, Vinn are required to build on the basis of these laws, knowing the laws of displacement. Black-painted rocks and water-filled shells emit electromagnetic radiation of varying wavelengths as they heat up. The temperature of an object, its heat radiation, occurs in an invisible part of the spectrum. When we look at the scale of the atoms that make up an object, thermal radiation is the emission of photons by excited atoms. It is necessary to take into account the latitude of the land on which the surface of the solar collector is built. The temperature inside the collector is increased by allowing sunlight to fall perpendicular to the surface of the collector. For the city of Karshi, in the summer months it is$38^0 \div 39^0$ [2]. Most of the solar energy falls on the infrared region of the spectrum, and almost half on the wavelength range of the spectrum from $4 \cdot 10^{-7}\ m$to $7 \cdot 10^{-7}\ m$ [1]. In summer, the temperature inside the collector is $65^0 \div 75^0$ available. The outer surface of the collector can be covered with transparent glass, keel or polycarbonate. It is advisable to use clear glass in windy places.

Conclusion. In conclusion, scientists have predicted that humanity will eventually have to turn to the Sun, the earth's main source of energy. [5] With the improvement of solar collectors, the temperature inside the drying cabinet can also be balanced. Depending on the season, melons and fruits can be packed in the drying cabinet.

References:

[1] Xayriddinov B.E. Sodiqov T.A. "Quyosh energiyasini akkumulyatsiyalash" Toshkent. "Fan" 1986 yil.
[2] G.E. Umarov, A.A. Yorshov "Quyosh inson xizmatida" Toshkent. "Fan" 1972 yil.
[3] S.Q. Qahhorov H.O.Jo'rayev "Fizika ta'limida geliotexnologiya"."Fan nashriyoti" 2009 yil
[4] R.A.Zaxidov, D.A.Kirgizbaev, X.N. Nuriddinov "Rezultati ispitaniy solnechnoy sushelnoy ustanovki" Jurnal. «Geliotexnika» №2 1990 y.
[5] Babaev B.D., Donilin V.N. «Geliosushelka sushki fruktov i ovoshey»
[6] Zaxarov L.A. Primeninie teploti v selekom xozyayste M. Agropromizdat, 1986 str. 2-5
[7] Sodiqov T., Xayriddinov. "Quyosh energiyasini akkumulyasiyalash"."Fan nashriyoti" 1998 yil. 55-58- betlar.

[8] B.Xayriddinov, B.Xolliyev “Quyosh meva quritgichlari” Fan nashriyoti. Toshkent 1990 y
[9] B. Xayriddinov, T.Sodiqov “ O`rta maktabda fizika kursini o`qitishda geliotexnika materiallaeidan foydalanish” O`qituvchi nashriyoti. Toshkent 1985 y
[10] T.Sodiqov, A.B.Vardiashvilli “Gelioteplitsalar va ularning issiqlik rejmlari” O`qituvchi nashriyoti. Toshkent 1996 y.