

SUNDIALS - ASTRONOMICAL DECORATION OF THE URBAN ENVIRONMENT

Korobko K. V.

National aviation university, Kyiv

Scientific supervisor – Agieieva G. M., Ph.D in Technical Science, Senior Research Associate

Introduction. Today sundials are elements of the facade solution of buildings or independent street/ park constructions. They have individual constructive solutions and architectural design that reminding about the old way of measuring time. In the urban environment, the most common are the clock with the vertical dial. Recently, the popularity of watches with horizontal dial, which are located in the territories of parks, squares, quays, etc., is increasing [1].

Formulation of the problem. Each type of sundial has it own advantages and disadvantages. The mode of operation is common to them - only by clear skies. Users of vertical watch can keep track of time from a distance. Horizontal clock watches require the presence of users at short distances or allow them to become a direct participants in the definition of time.

The object of study is the urban environment of Kyiv.

The subject of the study - features and means of implementation sundials with a horizontal dial in the architectural and planning organization of the city.

The research was carried out in March 2020 during the development of pre-project proposals for the organization of urban spaces in Kiev with the guidance of teachers of the department of architecture, design and town planning, the FABD.

Main part. The oldest sundials appeared around 3500 BC. The principle of working such a clock was very simple - changing the length of the shadow of the gnomon, the central axis or the column of the sundial indicated a change in the time of day. In ancient times, the sundial was foremost an astronomical tool used to calculate latitude. The popularity of sundials as a time-measuring tool has declined substantially since the introduction of the standard hour that lasts 60-minute. Nowadays, other devices first electronic ones perform these functions, while the sundial has a different role. There are several sundials operating in Kyiv, seven of which have a horizontal dial. They were built at the beginning of the XXI century in the territory of the city parks "Otradhny" (2012), "Molodizny" (2010), "Peremoga" (2011), park Vichnoï Slavi (2011), apartment complex "Sonyachna Brama" (2015), archeology monuments - near the foundations of the monastery of St. Theodore Tyrone (2016, [2]), the Dnipro quay (2019).

Circle-shaped watches have the indicator of movement of the gnomon's shadow in the form of a central vertical rod-obelisk (park «Peremoga»), rod installed at an angle (apartment complex "Sonyachna Brama"), metal, granite and concrete triangle (monument of archeology; park Vichnoï Slavi, park "Molodizny"). A clock in the territory of the archeology monument is mounted on a specific pedestal (pyramid),

containing additional information on the twelfth non-stop holidays of the Orthodox Church, related to the solar calendar [2].

Two clocks do not have gnomons: these are analemmatic clocks with a dial in the form of an ellipse and a date scale; it coincides with the ellipse axes and is oriented around the side of the world. A person can perform Gnomon functions and the arrows will be a shadow that a person will cast.

The principle of such a clock is used to calculate the insolation of the premises by the method of projections with numerical marks (insograph).

The laws of the visible motion of the sun, the rotation of its ray and the change of shadows were discovered in ancient times. In the ninth book of the treatise by the roman architect Vitruvius (I century BC), "Ten books about architecture" the **analemma** is given; it underlies the construction of trajectories shade within 12 months of the year from the vertical rod – **gnomona**. The curve that describes the sun in the sky during the year is called an analemma if you fix it daily at the same time of day. This ancient construction of the "dial" of the sundial is now used to build infographic lines.

Creating structures for sundials involves:

- careful selection of the construction area and their natural lighting conditions for the best facility's functionality;
- organization of the form and aesthetic parameters for attracting potential users (children, students, students, etc.);
- using structures and materials for the organization of comfortable and safe use, environmental protection [3].

Conclusions. The current tendencies of providing recreational and landscaping zones and territories of general use of educational and entertaining functions give the horizontal hour's particular appeal:

- personally become a participant in the definition of time and fulfill the role of a gnomon;
- to mention a school course of astronomy or to get acquainted with the laws of motion of the elements of the solar system;
- to evaluate the complexity or accessibility of the proposed time determination system, it's architectural design and urban planning.

It's anti-vandal solution is attractive because it's important for places with a high rate of recreational load [3].

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