

Street lighting St. Petersburg from 1703 to 1917

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Abstract. The article talks about the emergence of a street lighting system in the metropolis of St. Petersburg shortly after its founding before the 1917 revolution. The purpose of the study: a detailed analysis of all types of street lighting elements that appear in the structure of the rapidly growing St. Petersburg, including oil, gas, with an alcohol-containing mixture, kerosene lamps, lamps with arc lamps and incandescent lamps, street kerosene lamps. For each type, stylistic characteristics and technical differences are indicated, and the role of the lamp as an element of improvement is determined. In addition, architectural details and profiles that make up the luminaire volume are taken into account. Research methods: research of archival and library materials, historical maps, iconography. Results: the use of research materials can be both in the theory of architectural forms, and for the preservation and reconstruction of the historical environment of St. Petersburg, for the use of historical principles in new areas - analogues of historical lamps can be used as a standard in the improvement of open urban spaces, taking into account the existing scale, stylistic solutions, technological innovations

1 Introduction

The role of lighting in an urban environment is very difficult to overestimate. The safety, comfort and psychological state of city residents, especially of a large metropolis, depend on this. The problem of lighting the streets of St. Petersburg has worried all Russian emperors since the founding of the city. The development of lighting devices always occurs in parallel with the development of architecture, infrastructure, as a set of measures taken to improve landscape design. Street lighting is tightly woven into the urban fabric, it is an integral element of the ensemble of St. Petersburg, developing and enriching throughout its development from the foundation to the revolution. In addition to development, as an element of comprehensive improvement, lanterns are also improved as separate elements of artistic value, reflecting the technological, aesthetic features of their time. Studies like this were conducted in related disciplines: urbanism S.V. Sementsov, studies of architectural fragments E.R. Wozniak, elements of art metal E.V. Zholobova and a significant number of other authors.

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2 Materials and Methods

The study of the historical elements of the improvement of the capital of St. Petersburg requires the study of a significant number of sources. Materials for this article were obtained from several groups of sources. Among them: archival materials, including albums of manufacturers of lamps, buildings, including lamps as elements of buildings located in separate sections; historical maps of the city; descriptions of St. Petersburg related to the historical periods under consideration; non-fiction, including articles and dissertations; iconography.

3 Results and Discussion

In 1706, St. Petersburg, which has already become the seat of high-ranking officials and statesmen, celebrates the victory of Russian troops over the Swedes near Kalisz. The city, which has not yet been landscaped, does not have stationary street lamps, and in honor of the holiday, the streets facing the Peter and Paul Fortress are illuminated by lanterns made from houses with oil lamps or wax candles, plate-shaped lamps and scales that amaze foreigners with the number and variety [1, 2]. Since that time, a regular and extensive practice of using fireworks and illuminations in the celebration of military victories, anniversaries and other celebrations begins.

In addition to special cases, it was necessary, as in European capitals, to create regular night lighting in the city. In 1717, the chief architect of St. Petersburg and the author of the master plan of 1717, Jean-Baptiste Alexander Leblon, included regular street lighting in the city's layout. Later, according to a sketch authored by Leblon himself, a "model" lamp was made (by analogy with "model houses" for harmony and uniformity) and installed in the Winter Palace on the banks of the Neva. Leblon's lantern was supposed to illuminate the streets four nights a year for five night hours [3] and consisted of a wooden column square in cross section and tapering to the top, painted with contrasting slanted stripes in white and green colors (similar to the coloring of many other landscape design elements for example, gatehouses and fences), with metal elements of an arm and a glass light chamber with an oil burner. In addition to the significant costs for the manufacture of the lamps themselves, it was necessary to bear the costs of maintaining fire, as well as their maintenance, which the police (ordinary and non-commissioned officers) did until 1763, while the rapidly growing city needed to be equipped with a significant amount in a short time Street lights. The street lighting project required the installation of 141 large lamps at a distance of 100 meters and 754 small lamps at a distance of 35-40 meters, and the Senate decided by decree of December 23, 1723 to raise funds for regular lighting from homeowners, while in 1724, by decree of Peter, they started to install already fixtures of the new "Dutch type", which do not have decorations, brackets, with a simple tetrahedral column and a glass lamp with a tin frame mounted on it. The height of such a lantern was about three meters, and the level of illumination was extremely low. In addition, the lamps were heavily smoked and required constant monitoring (Fig. 1).

Both types mentioned above were easy to maintain: a ladder was attached to them, in the chamber to which the lamp was suspended, there was an opening door. Both the Leblon lantern and the Dutchman carried the minimum aesthetic load, barely coping with their functional purpose (as such, they did not light the street, but only helped not to lose direction). These species do not have a pronounced stylistic characteristic of the Baroque era of Peter the Great, which dominates the architecture of their time. Under Elizaveta Petrovna (1741-1761 years of reign), after a period of complete absence of regular lighting of the streets of St. Petersburg and a significant increase in the scale of urban construction, the role of landscaping elements increased significantly [4]. Lanterns

become an important part of the aesthetic perception of the capital and, finally, begin to correlate with the architecture of the Elizabethan Baroque [5]. The shape of the support becomes flaky, with many decorative elements and an inscription (Fig. 2). The light chamber does not have flat glasses, it is blown in the shape of an egg from the holder on the bracket, the upper part of the chamber is cut off and closed with a metal cap for servicing the lamp. The bracket is pretentious, twisted and bizarre in shape. The lantern of Elizabethan time carries a significant decorative load, it illuminates the street well, moving the camera to the bracket, while the manufacture of a blown chamber is much cheaper than casting and polishing flat glasses, which allows to increase the number of lighting elements installed for improvement. Lanterns with a prismatic foundation by this time are considered obsolete and are installed only on moorings and bridges, illuminating the water area and making the passage of ships safe. They often have the shape of an obelisk (preserved until the twentieth century). However, serving lanterns are still not enough, and only the main, "noble" streets are lit. Presumably, about a hundred lit up the space at the Winter Palace of Elizabeth Petrovna and part of Neva Avenue from the Admiralty Meadow to the Moika River. The authorship belongs to Bartolomeo Francesco Rastrelli, the brightest representative of the Elizabethan Baroque.

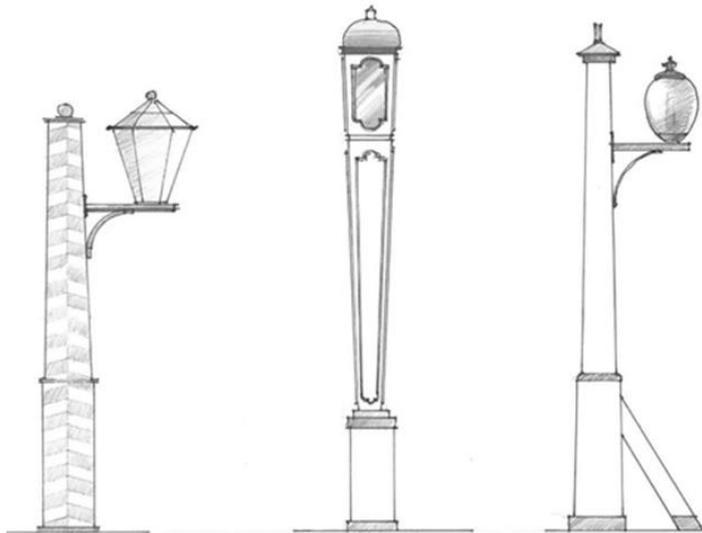


Fig. 1. The first oil lights



Fig. 2. a) oil Elizabethan lantern, b) oil Catherine's lantern, c) lamp of seven stone bridges across the Fontanka, d) lamp of the Trade Bridge, e) oil lamp of Catherine II

During the reign of Catherine II (1762-1796), there was a significant improvement in the quality of street lighting. This is primarily due to the increase in the pace and volume of construction, the improvement of embankments (which were actively laid), the construction of bridges across the rivers and canals of St. Petersburg [6]. In addition, with the change in the stylistic characteristics of the era (from Elizabethan baroque to Catherine classicism), the role of the ensemble in the role of urban development increases, and the elements of landscaping, including stand-alone lamps on the facades, become integral parts of the integrated design of urban areas [7, 8].

Bright examples of the lanterns of the Catherine's era are the lanterns of the preserved bridges of Lomonosov and Staro-Kalinkin (there are seven typical three-arch bridges that once served as crossings over the Fontanka, architect Jean Rodolf Perrone). The granite body of the lantern is cylindrical, narrowed. Visually stable, has a pronounced thickening in the form of a parallelepiped, "worn" on the body (Fig. 2). Metal brackets with prismatic light cameras are attached to this form. The lantern is a classic column resembling an obelisk mounted on a pedestal included in the granite fence of the bridge, with a base, with additional brackets, cameras and a decorative metal top, which fully reflects the severity and simplicity of architecture Catherine classicism, manifested in small architectural forms [9, 10].

Another no less striking example is the lanterns made in the general composition of the trade bridge with an arm for one light camera (Fig. 2). Lamps taken out of the fences on their own pedestals harmoniously fit into the architecture of the bridge thanks to the shoulders with cameras located to each other and parallel to the edges of the bridge. The lanterns are painted with restraint, even ascetically - a modest low-profile granite pedestal on the same granite intermediate supports, taken out of the main size of the bridge, a square metal section with a base and a completion (similar to the profiles of classical columns) and a shoulder with a small number of spirals made of a wide strip and supporting a circular tube in cross section holding the circular chamber. Such restraint and repetition of the architectural profiles of building elements is a characteristic feature manifested in the elements of improvement with Catherine classicism, as well as the stability of supports, straight or tapering up and shorter with respect to Elizabethan brackets [11]. At the same time, Catherine, in contrast to the Baroque forms, preserved the beautification elements that were installed during the reign of Elizabeth Petrovna, and her court architects saturated the architectural environment in a new style in balance with the original building [12].

For festive lighting under Elizabeth Petrovna and Ekaterina, special lamps were used "with a lit lamp of mica and cotton paper" [13]. Such lanterns, as well as various bowls, were installed along perspectives, along the architectural lines of buildings and small architectural forms, and were fixed with a cap and large-scale rings on illuminated decorations [14].

The shape of the lanterns was of the most bizarre character - with monograms, curves, curls, round, oval cameras. Instructions for the manufacture of lamps and lights were published in a Moscow printing house by Major Danilov and were called "Satisfied and clear evidence, according to which anyone can prepare and make all kinds of fireworks and various illuminations, Major Mikhail Danilov composed artillery in 1777. In Moscow at the university printing house of 1779".

During the reign of Paul I (1796-1801 biennium), the capital was well lit. Illumination of Nevsky Prospect continued until the Ligoivsky Canal, the city inherited lamps on the bridges (round cameras were preserved mainly on them), lamps with prismatic lamps again became widespread, and now a significant number of them fell on the facades of buildings. Stylistically new lamps differ from Catherine's (figure 3). They are more austere in form, shorter, and contrasting stripes reappear at their bases (as in gatehouses, barriers and other enclosing and marking elements that reflect the militaristic preferences of the ruler).

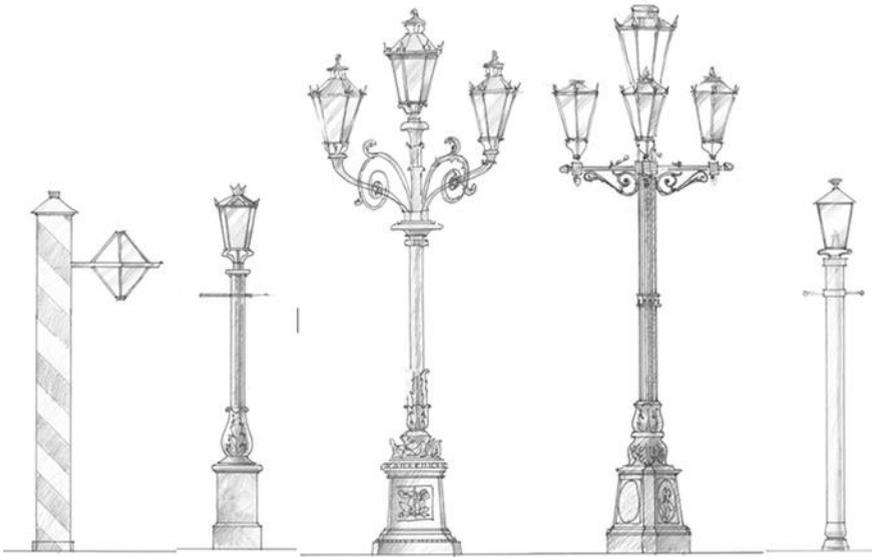


Fig. 3. a) The oil lamp under Paul I, b) The first gas lamp, c) Gas floor lamps on St. Isaac's Square, d) gas floor lamps on the Senate Square, e) Kerasin lamp

Before the advent of gas lamps in 1839 and almost immediately after lamps with an alcohol-turpentine mixture in 1849 and kerosene lamps in 1860, the typology of St. Petersburg lamps did not fundamentally change. The only significant addition is more functional than aesthetically pleasing in nature - this is the beginning of the use in 1804 of a “reflective shield” at the suggestion of a foreigner Leonard Otier [15]. In fact, Otje “reflective shields” are reflectors added to the design of oil lamps, which with the same amount of product and burners can significantly increase the illumination of the space around the lamp. The innovation was immediately used in the manufacture of lamps, and without reflectors they were almost inaccessible.

The gas lanterns that appeared on Palace Square, Malaya and Bolshaya Morskaya, Gorokhovaya, Millionnaya, Sadovaya and Nevsky Prospect streets, with a total of 204 pieces, were with cast-iron supports, inside which was a gas pipeline (a thin pipe made of lead). and iron) on which the light chamber was installed (Figure 3). Due to the proportions inside the gas pipeline support case, the lantern was rather squat - low, about 4 meters high, 1/5 of which was occupied by a rectangular base with a barely noticeable profile, a transition element to a narrower, but still wide column with grooves to on the upper part, small staples with snails and acanthus leaflets were fastened in two directions (they served as a crossbeam to support the stepladder). The lamp itself had proportions elongated upward, mounted on legs to a support and had no bottom (to avoid an explosion). The shape of the burners screwed into the upper part of the gas pipeline was of several types: the simplest gave the flame like a candle, a fish tail, a trefoil; split - flat or hemispherical, with a gap in the middle, and the flame from it was fan-shaped, in the form of bat wings; there were also various nozzles directing gas into several horns with burners at the ends. Over time, the shapes and proportions of the lamps became more sophisticated and varied, the height of the floor lamps increased, and gas lamps appeared on the brackets, which were attached to the facades of buildings. Of the surviving ones - the lights of the Blagoveshchensk bridge, designed by the engineer D. Tsvetkov in 1850 at the Charles Beard's factory [16], after the reconstruction of the 1939 bridge installed on the Champ de Mars (modern lights were designed by architect M. M. Peretyatkovich [17] installed in 1906), lanterns in the Catherine Garden, lanterns in the Senate and St. Isaac's Square (Fig.

3). These are vivid examples of complex in shape and increased in height multi-stage gas street floor lamps. The shape of the bases is very complex - it is a truncated tetrahedral pyramid, profiled, with truncated corners, panels filled with medallions, cartouches and compositions with acanthus sheets on large sides, and a trihedral pyramid with concave large sides, similar in complexity. and filling, and a short low polyhedron - the forms of the bases are diverse, like other elements of floor lamps. The floor lamp's trunk becomes shorter, often it's not just a cylinder with grooves, but a tapering shape growing from acanthus leaves, which, in turn, grow from a very difficultly sculpted multi-row transition of the plant from the base. The barrel always has a complex profile that extends upward in the place where the brackets are fastened. The brackets themselves are significantly different from each other - some grow so smoothly from the support body that they can not always be identified as a full-fledged bracket. Others, decorated with curls, acanthus, or both at once, either from below or from above, adjoin the supporting crosspiece, supporting it with great weight or a considerable distance from the camera. The third - in fact, these are not brackets; these are pipes bent at right angles with rounding, held in the middle and at the joints with other elements.



Fig. 4. a) the arc lamp of the Green Bridge, b) the arc lamp of the Nevsky Prospect, c) the electric lamp of the Nevsky Prospect, d) the floor lamp of the Blagoveshchensky Bridge

The appearance of gas lanterns coincides with the heyday of the eclectic era, respectively taking into account the stylistic features of that time, the variability, complexity and sophistication of lanterns exceeds all previously existing samples. Such lanterns, taking into account the possibilities of iron casting, the corresponding elements, not only in terms of decorativeness, but also in size and monumentality, open up new possibilities for using them as the most important components of the ensemble, allowing you to design megalopolises, squares, avenues and correlated with urban development dominants (monuments, stellas, etc.)

Appearing almost simultaneously with gas, lanterns with an alcohol-turpentine mixture did not fundamentally differ in shape and size from simple oil ones, the chambers were hexagonal and were mounted either on an arm or on a wooden support. The difference was in the lamp - it was no longer suspended, but was a bottle with a combustible mixture, placed at the bottom of the chamber.

Kerosene lanterns did not seem to differ much from gas ones, but had a thinner barrel, and the tetrahedral luminous chamber was closed from below (Fig. 3). Cheaper simple options with stands in wooden design were installed on the outskirts of the city and do not carry a decorative load. Initially, all kerosene lamps were foreign, but the low cost of the material allowed to gradually replace imported kerosene lamps with domestic ones.

A fundamental change in street lighting occurred in 1872 with the installation of prototypes of electric lamps with incandescent lamps by engineer Lodygin, supplemented in 1883 by the installation of arc lamps on the main streets of St. Petersburg. This first electric lighting of the capital was extremely expensive, with generators supplying lights, it was also not easy, and the maintenance of such lighting equipment was problematic - due to the sharply increased height of the electric lamp, it was possible to carry. Change the replacement in the light chamber by lowering it with special device 9 (Fig. 4). A little later, in 1895, kerosene incandescent lamps, invented by Dr. Auer von Wilsbach, began to be used to illuminate the city. In appearance and the principle of refueling, they practically did not differ from arc ones, they had almost the same light intensity. Such lights existed until 1918, when they were completely replaced. Due to the great similarity with arcs, there is no need to consider their aesthetic features separately.

The trunk of the electric lamp was not distinguished by sophistication - several cylinders stacked on top of each other and slightly tapering with not rich profiles at the joints, stood on an equally simple stand, occupying about one seventh of the entire lamp. But on the other hand, an electric lamp provided great opportunities for drawing shapes of light chambers - these were balls, truncated pyramids and various teardrop-shaped shapes. Instead of the hood, which ended the chamber of the gas lamp, the arc had a regulator of coal rods.

With the advent of electric lighting, it was decided to install a new type of fixtures in the middle of Nevsky Prospect. Thus, floor lamps played a significant role in the formation of the avenue [18- 20] (and other streets, squares and bridges beyond) - high, from eight to ten meters, they were examined from all points, formed their own axial lines in open urban spaces, therefore, not only cameras, but also brackets, and decorative snails, and other elements were painted with great sophistication (Fig. 4). All these details reflected the style of the final period of eclecticism and the beginning of Art Nouveau (the curvature of the upper part of the floor lamps, becoming a kind of bracket, drawing a snail, lengthening the ceiling and their lamps). Such floor lamps establish a new scale for the beautification elements in the city, which is constantly being reformed, and that most importantly, the metropolitan environment is becoming part of a changing, complemented ensemble. In addition, electric lanterns began to be widely used to illuminate the entrances to buildings and give greater aesthetic expressiveness to facades (for example, the building of the Society of Singers).

Electric lights not only became new elements of urban ensembles, but also surpassed all previously existing types in their brightness. When conducting a comparison at the end of the 19th century, it turned out that with a unit of measure in one stearin candle, a kerosene lamp gives 10.5; alcohol - 5.5; gas - 19 candles. Emerging arc lamps and incandescent lamps gave 25 candles. They significantly improved the quality of improving the urban environment, comfort and safety of residents.

4 Conclusion

Improvement of St. Petersburg today is the most important and solvable task for every day. Work to saturate the urban environment is being carried out both in historical and in new areas. In this vein, the following recommendations are preferred.

1. It is necessary to use historical analogues to carry out complex design work, preserving the unique ensemble environment of St. Petersburg, including in new areas. For them, historical analogues are an example of the use of landscape design elements in a single composition with architecture and the surrounding infrastructure.

2. The use of lighting elements that previously existed on the territory of urban historical areas should be recommended as a method of restoring the lost ensemble environment typical of St. Petersburg. For each specific case, you can choose several samples, often with different temporal and stylistic characteristics, given the building belonging to a certain period of time and the surrounding elements of improvement, observing the general composition of the street ensemble, avenue, square.

3. It is necessary to supplement the historical environment, taking into account modern conditions, which are far ahead of the analogues used in pre-revolutionary St. Petersburg, while preserving not only the sizes and proportions, but also the structure of the elements, previously used materials and colors.

4. The use of historical lighting elements should not only aesthetically, but also be technologically related to the current situation. Today, when a significant number of historical buildings have decorative illumination of facades, it is necessary to observe a measure of illumination, not only not highlighting open city spaces, but also not crushing, not violating visually the composition of lighting of building facades and other improvement elements.

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