

# **Guns of the 16<sup>th</sup> century from the collection of Lviv historical museum**

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*Two models of artillery of the 16<sup>th</sup> century are analyzed in the article from the collection of Lviv Historical Museum. The technology of application of hook cannons and long-barrel small-caliber guns is considered. A comparative description of the structural features of the guns design that influenced the differences in application is made.*

Keywords: hook cannon, long-barrel small-caliber gun, artillery of the 16<sup>th</sup> century, Lviv Historical Museum.

Historical weaponry science is an integral part of military history. Comprehensive study of each individual cannon, which are stored in the museum collections, will enable weapon scientists, historians and those interested in history of artillery development to trace the evolution of this type of weaponry, understand exactly why, when and how particular constructive features of barrels were improved and changed. The use of comparative analysis will make the study of features of using different cannons of one time period possible.

## **I. State of problem study.**

The history of firearms has always belonged to important research issues for military historians, the reflection of the fact can be seen in numerous scientific works. Although the quantitative composition of arsenals of Ukrainian castles and fortresses of the 14-18<sup>th</sup> centuries has already been sufficiently thoroughly studied (works by M. Hrushevsky, I. Krypyakevich, V. Alexandrovich), the question of qualitative analysis remains insufficiently processed [1; 8; 13]. In the monograph "Arsenals of Ukrainian castles of 15-17<sup>th</sup> centuries" O. Malchenko reviewed the history of the development of artillery and systems of state arsenals on Ukrainian lands in the 15-17<sup>th</sup> centuries, giving partial analyses not only of their quantitative but also qualitative composition [9]. Separately the author highlighted the personal composition of the Ukrainian gunners, the conditions and character of their service.

A significant contribution to the study of the history of the appearance and development of artillery of 15-18<sup>th</sup> centuries in Lviv was made by K. Badetsky. In the works "Lviv metal casting of the times of Zygmunt I" and "Medieval Lviv metal casting" the author describes which masters and when worked in the city, partly analyzes inventory descriptions of the city arsenal on the basis of documentary sources analysis [2; 3]. In contemporary Ukrainian historiography, the problem of individual item study of artillery artifacts is presented by works of O. Malchenko and M. Verkhoturova. Study of the issues of the history of formation of museum collections of artillery still remains unsatisfactory and needs further processing.

## **II. The purpose of the author is thorough analysis of the structure of the described models that affects the way of their application.**

Today in the collection of Lviv historical museum there are two models of artillery of the 16<sup>th</sup> century, in inventory books they were assigned numbers Z-2875 and Z-2878 [6; 7]. They are very similar visually and constructively, but each has its own peculiarities of application. We associate these two models with light artillery, thus we consider comparison of their characteristics that affect the differences in application expedient. Fig.1



Fig.1

The artillery gun under the inventory number Z-2878 is forged iron hook cannon of the 16<sup>th</sup> century. The term “Hook cannon” was used for long heavy rifles with a distinctive constructive feature, the hook, which was located in the muzzle part of a barrel, usually closer to the muzzle cut. The main designation of the hook was to reduce gun recoil during firing. The hook was hung on a wall, buttress, parapet or other support. The name, of course, also comes from this constructive feature - a hook. This type cannons we widely used throughout the territory of modern Ukrainian lands up to the 17<sup>th</sup> century. Not only Ukrainian castles and cities used them extensively but also the Cossacks army [9, p. 305-312]. This is due to several factors: firstly - they were relatively inexpensive, secondly, - easy to use and comfortable for fast transfer, and thirdly - easy to make. However, hook cannons had some flaws common for almost all kinds of artillery of 15-18<sup>th</sup> centuries, primarily related to the accuracy and range of shooting.

Let's describe the hook cannon from the collection of Lviv Historical Museum under inventory No. Z-2878.

Total length of the barrel: 1450 mm

Length of the barrel channel: 1417 mm

Diameter of the barrel channel: 25 mm

Diameter of the inflammatory opening: 5 mm

Distance from the base ring to the center of the fuse: 35 mm

The gun body is structurally and visually divided into two parts – muzzle and cartridge parts, which correlate with each other in a proportion of 1: 4.

The cartridge part of the barrel is made in the form of an octagon, with a length of 310 mm. The inflammatory fuse (opening) is located on the right lateral edge at a distance of 35 mm from the cartridge cut. Under the inflammatory fuse there is a fully corroded powder shelf, with the length of 40 mm, and width - 15 mm. On it, there is a remnant of a pintle to which a cover of a powder shelf was hinged, now this item is lost. On the lower edge, at a distance of 100 mm from the cartridge cut there is a thin ear to attach the hook cannon to the wooden riffle bed. The same ear is placed at a distance of 670 mm from the cartridge cut.

The muzzle part is made in the form of a smooth barrel.

The hook is located 110 mm from the muzzle cut, is figuratively carved, its maximum length is 170 mm, minimum - 80 mm, thickness - 8mm. Fig.2



Fig.2

The hook cannon is equipped with a sighting system. Mushroom-shaped barrier with a cut through the center (width at the base - 7 mm, width from above - 10 mm) is located on the central upper edge of the cartridge section at a distance of 85 mm from the cartridge cut. The sight is located at the distance of 60 mm from the muzzle cut. The wooden rifle bed is lost.

Under inventory number 3-2875 in the collection of Lviv historical museum is a forged iron long-barreled small-caliber cannon. In the 16<sup>th</sup> century small-caliber long-barreled cannons were used both for fortress defense and for field operations. Usually they were installed on a wooden tripod - the so-called "goat", or on the gun carriage. They shot stone, lead, iron or cast iron cores. They were widely used for the arming of Ukrainian castles and cities [9].

The description of the gun from the collection of Lviv Historical Museum under the inventory number Z-2875:

Total length of the barrel: 2060 mm

length of the barrel without a plate and vingras: 2040 mm

diameter of the barrel channel: 25 mm

length of the barrel channel: 2000 mm

diameter of the inflammatory fuse (opening): 4 mm

Distance from the base ring to the center of the inflammatory opening: 31 mm.

The gun body is structurally and visually divided into two parts - muzzle and cartridge part, which correlate with each other in the proportion close to 1: 2.

Cartridge part is octagonal, length 740 mm. Inflammatory fuse is located on the central upper face in the barrel without a powder deck. At a distance of 10 mm from the opening on the side of cartridge part there is a rounded hollow with a diameter of 10 mm for pouring gunpowder. Plate is flat, 55 mm in diameter.

The muzzle part is made in the form of a smooth barrel.

The gun is equipped with a sighting system. Mushroom-shaped sight with a cavity in the center (width 23 mm, height 10 mm) is located on the central upper edge of the cartridge section at the distance of 106 mm from the cartridge cut. The sight is located at the distance of 16 mm from a muzzle cut.

The studs are one of the features of this cannon, they were planted on the barrel with a ring of 30 mm width after the gun had been forged. Fig.3



Fig.3

The studs and the ring are made of the same piece of metal, which was cut through in the middle, and the ends of which were formed in the studs, and the hole - adapted to the shape of a circle whose diameter is equal to the outer diameter of the barrel in place of landing (probably, on a hot spot). Studs are asymmetrical, the length of the right one is 22 mm, diameter 15 mm, the length of the left one - 37 mm, diameter 15 mm. On the lower part of the barrel there are traces of inflows. We assume that at this place there could be a hook which was damaged or broken. Probably, it was the loss of the hook that led to installation of the ring with studs for setting. The outer surface of the muzzle part of the barrel was smoothed with a file after manufacturing to minimize traces of blacksmith welding. Neatness of visualization of the facets' corners of the cartridge parts, evenness of the facets surfaces and absence of visible traces of blacksmith welding can also serve as evidence that after blacksmith welding they were further smoothed with a file. Faceted elements of the barrel structure, decor in the form of geometric ornament, in our case - friezes of triangles, diamonds and points made by the chipping method, decor of deep parallel lines are the characteristic features of the decoration inherent in the Gothic style, which prevailed in cannon decoration in the 14-16<sup>th</sup> centuries. However, it was quite often used in the 16<sup>th</sup> century [14]. Epigraphy or labeling are absent. The manufacturing technique of both barrels, styling décor, similar sighting systems allow us to assume that the guns are made by the same craftsman.

During conservation the two guns were treated with tannin, which gave metal black colour. Today's state of the barrels is satisfactory. Visible traces of corrosion were not detected.

By structural feature of the barrels design, the described models differ in the location of the inflammatory fuse (opening). In a long-barreled gun the inflammatory fuse is made on top of the cartridge part, in the hook cannon it is located on the right side of the cartridge part. Caliber and barrel thickness are the same. Sighting systems are similar. The guns differ in the length and weight of the barrel. We will analyze these characteristics of the barrels.

The barrels of both guns are massive forged iron pipes of cylindrical shape, closed with an iron stopper - so-called cartridge screw, from the cartridge side. Charging of both guns occurred from the muzzle. The canal of the barrel was filled with gun powder charge, with the help of a snapper a wad and a bullet or a small core were sent into, they could additionally be wrapped around into fabric that served as an obturator [14, p. 319-328].

In the long-barreled gun inflammatory powder was poured directly into the hole. In the hook cannon the inflammatory fuse is located on the right side, so the inflammable powder was poured on the shelf. In such way the described models were prepared for shots. Two people were needed to carry out the shot itself from both guns: one aimed a sight, the second - by the gunner's command set fire to gunpowder with the help of a hot iron rod or a jerk. Inflammable

powder caught fire, it came through the incendiary hole into the barrel canal and a shot itself occurred. Sometimes the inflammable powder burned down, but the shot did not happen. In such a case the shooter had to clean the incendiary hole, pour gun powder again and set it on fire.

Note that the transfer of the inflammatory opening (fuse) of the fortress fire-fighting weapons to the right side of the cartridge part took place in the 16<sup>th</sup> century, and it was quite essential technical improvement, which was evidently due to the need for more precise shooting [10]. Let's consider this moment in detail. A gunman holds the weapon pointed at the target, aiming line goes along the surface of the barrel. If the incendiary hole was placed on top of the cartridge part of the barrel channel, at the moment of a shot, during a period of burning of gunpowder, just before the eyes of the gunner rather strong smoke appeared and at this very time the accuracy of the weapons was usually lost. If the incendiary hole was located on the side, the smoke occurred somewhat away from the eyes and did not block the target line which allowed the gunner to hold the weapons pointed at a target. It is worth noting that the guns, which were installed on the gun carriages did not need that improvement. We do not have exactly accurate evidence of such characteristics of described types of weapons of 16<sup>th</sup> century as speed and range of shooting. But, on the basis of numerous studies, it is assumed that the speed of firing was no more than one shot in 2-3 minutes, and range - no more than 400 steps [14; 15].

### **III. Conclusion**

Since the described above guns lack labeling and epigraphy, we can not state that they were made in Lviv. However, we consider it expedient to partly highlight the state of provision the city with artillery of the described type. Lviv has always cared about its safety. In the 15-17<sup>th</sup> centuries the city was an important center for manufacturing artillery. From the 16<sup>th</sup> century there were two foundries in the city – near the Galician and Krakow gates, where guns were made. By the act sources in 1534 in Lviv arsenal there were, apart from other guns, 6 hook cannons, 780 tin and 570 iron bullets for them, in 1558 – 13 hook cannons, 240 tin and 500 iron hook bullets, 4 long iron guns, in 1570 – 6 hook cannons and 380 iron bullets for them [12].

Today, historical weapon studies are actively developing in Ukraine. Research of artillery artifacts of the 14-18<sup>th</sup> centuries in modern museum collections will enable not only better understanding of the development of the gunsmith art and peculiarities of application and structure of one or another gun, but also will become a vivid accent in the study of centuries-old military traditions.

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