

## EMERGENCE AND DEVELOPMENT OF ANTI-AIRCRAFT ARTILLERY DURING THE FIRST WORLD WAR

There is analyzed the history of creation and development of anti-aircraft artillery during the World War I. Studied circumstances of the emergence of new military equipment. Successful use of aviation for military purposes before and during World War I was the impetus to increase the number of combat aircraft, and with it to development of anti-aircraft weapons. World War I served as impulse for the creation of air defense and development anti-aircraft artillery.

*Key words:* history of anti-aircraft artillery, air defense, weapons and military equipment, World War I.

*Background.* History of mankind shows that phenomenal achievements in science and technology always caused the revolutionary transformation of means of the armed struggle. Were appearing new types of weapons and new types of troops, were radically changing the ways and means to achieve the goals during the war. Scientific discoveries in the field of aerodynamics and theory of flight, led at the turn of the XIX and XX centuries to the emergence of aeronautics and aviation, which immediately caught the attention of military experts. This greatly stimulated their rapid growth and use for military purposes.

Military aviation appeared in various countries a few years before the World War I. For the first time aviation took part in the fighting during the Tripolitanian War (1911-1912) between Italy and Turkey, in which took part 7 Italian aircrafts that were used mainly for reconnaissance, simultaneously attempted to make the aerial bombardment

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of enemy troops. Successful use of aviation for military purposes was the impetus to increase the number of combat aircraft. Implementation of guided airships and later aircrafts in the military affairs complicated the fight against air targets. It was necessary to create a special gun and develop new rules to fight against air targets. Appeared an urgent need of the emergence and development of new guns, which would have had a direct destination to combat against aircrafts and balloons. This led to the emergence of anti-aircraft artillery.

*The state of problem research* doesn't fully reflect the integrated nature of occurrence of history of anti-aircraft artillery in leading armies – of the then members of the First World War. Quite diversely presented, for example, Russian historiography where there are the works on organization of air defense of the important logistic objects of Russia during the war years (N. Svetlyshyn), actions of aviation and anti-aircraft artillery during Brusilov Offensive (S. Averchenko, A. Lashkov), air defense from the experience of World War I (N. Ageev) and other topics. Interesting material is contained in the monographic researches on the history of aviation. However, in general, there is no overall analysis of the history of occurrence of anti-aircraft artillery of combatants.

*The novelty of research* is in the complex exploring of historical sources and literature for the purpose of comprehensive presentation of current views on the reconstruction of history of occurrence anti-aircraft artillery.

*The purpose of this research* is historical discourse in the development of anti-aircraft artillery, whose appearance is caused by the events of World War I and the widespread use of aircrafts, balloons, airships in hostilities.

*The main material.* In Germany the company Rheinmetall before World War I created the armored car with a new 50-mm gun, which was intended for shooting at guided aeronautical devices [6, p.112]. At the same time the German servicemen continued the work on improving the field cannons for fight against air targets. In 1910, for this

was adapted 100-mm gun, whose carriage was dug in the land during shooting. Such gun increased the firing angle by 40 degrees. Similar task solved also 150-mm gun with gun shield on the carriage. Also in the same year, the company Krupp constructed a special 60,5-mm anti-aerostatic gun [4, p.5]. Before the First World War, in the armed forces of Germany there were 18 anti-aerostatic guns [8, p.52].

In France dominated the official view that the field 75-mm gun of model 1897 was able to solve all tasks in the fight against air targets [9, p.27]. At the same time the French experts were actively working on the project of special automotive cannon of the design of Colonel Depor for destruction of air targets. But in August 1914, in the French army there was only one such cannon, which also served as a field and anti-aircraft [10, p. 4].

The Russian military department, starting from 1908, tested for the fight against air targets 3-inch rapid-fire field guns of model 1902. These firings sometimes gave positive results, therefore it was believed that there was no need to create special anti-aircraft cannon. In addition, the military leadership argued that enemy aircrafts would never dare to fly over the positions of Russian troops, as Russian guns were able to destroy any air enemy [4, p.11].

In the publications of 1911, «Rules of firing of field artillery» for the first time (in paragraphs 118-128) were considered the issues of firing at air targets – airships and balloons. In the explanatory note to these Rules of firing was indicated that «to fight against moving air targets generally required special guns very movable and with a large vertical and horizontal fire. However, in the absence of such guns, field guns should as far as possible, to take on the task of the fight against the moving air targets» [5, p.52].

Russian military scientists of the gunnery developed the project of anti-aircraft gun with a special carriage, ammunition and a means of aiming. In June 1914 Chief Artillery Administration of the Russian Imperial Army approved tactical and technical data to develop the design of anti-aircraft gun

and ordered the manufacture of such guns on prospect. So, on the eve of the First World War almost all military forces of states, which later took part in the fighting, were not prepared to repel an attack from the air. Such situation was largely explained by the fact that at that time there was no clear idea about how exactly would be developed the combat aviation, so the issue of creating of special guns was being resolved very slowly.

Despite the individual cases of combat use of aircrafts in 1910-1913, aviation became widely recognized as a real and effective weapon only with the outbreak of World War I. Already in the campaign of 1914 began a period of rapid development of all branches of numerous aircraft equipment, which could not be noted in any field. About that great importance which gained military aviation during this period, clearly proved the numbers of quantitative growth of military aircrafts during 1914-1918 years. For example, France before 15 August 1914 had only 162 military aircrafts, but before 1 April 1918 the number of aircrafts for various purposes, which were in service, reached 2750. Overall, during the war the French industry built nearly 51,000 aircrafts and 92,000 engines. Germany in 1914 had 170 aircrafts, and during the wartime German industry produced almost 47,000 aircrafts and 40,000 engines. At the beginning of war the air fleet of United Kingdom consisted of 60 aircrafts, and over four years the British built 26,000 aircrafts and 29,000 engines. During the wartime in Italy were also built more than 20,000 aircrafts and 35,000 engines [12, p.105].

In Russia before August 1914 in the fleet and in the army there were 263 aircrafts, mostly of French firms or built under French licenses. In general the aircraft fleet of the Entente countries during the war increased in 13,6 times, and the Triple Alliance – in 12,9 times [10, p.3].

During its formation and development the military aviation was prepared to perform reconnaissance tasks only under ordinary weather conditions. However, even the performance of such tasks was of great importance: out of the plane could

see the enemy troops on the march and in concentration areas, inspect large areas and quickly deliver obtained data. At the same time there was no experience of the fight against aircrafts in the air, air defense did not create any major obstacles to the flight of reconnaissance, troops didn't use any measures of masking from air enemy during the movement and location [12, p.107].

Experience of flights to enemy rear immediately attracted the attention of military experts who sought to use these opportunities of aircrafts for destruction the enemy forces and their logistic facilities. Pilots took with themselves to the air the hand grenades, boxes with steel arrows of 120 mm length and 20 grams weight, autorifles. All this weapon was used against infantry and cavalry during their attack. And though the real enemy losses were small, the psychological impact was enormous, even the flight of aircraft at low altitude over the battle formations of cavalry caused the panic among the horses and frustrated attack [12, p.107].

It should be noted that in 1915 the three major kinds of military aircrafts were defined: scouts, bombers and fighters. With the emergence of aircraft-bombers the bombing from the air became possible. The first experience of bombing was in August-September 1914. It was performed with very primitive bombs which were loaded directly into the cabin of the aircraft and delivered with the help of hands. Moment of delivering was determined «by eye», hence the accuracy of such bombing was very low [13, p.41].

In the process of improving the performance characteristics of aircrafts-bombers the aviation began to be widely used for the task of bombing attacks of the troops and facilities of the rear in the tactical and operational depth, as well as for attacks on industrial and administrative and political centers in the hinterland. Directly objects of bomber aviation became railway stations, cities, enterprises for military purposes, bivouacs and columns of troops and also enemy artillery on positions.

Air strikes against the objects of deep rear during the First World War were inflicted mainly on the Western

European theater of military operations. This was because the important areas of Britain, France and Germany were within range of all means of air attacks, which were at that time.

In the East European theater aviation was used primarily for reconnaissance, bombing of troops on the battlefield and railway junctions in the front-line. For example, in May 1916, before the attack of infantry of the 7th Russian Army nearby the village Yazlovets, the Russian command organized a powerful air raid with 30 aircrafts – scouts and bombers. As discussed in the order of the 7th Army of June 6, 1916: «Dropped bombs and machine-gun fire caused losses and a mess of enemy troops. Direct hits in Yazlovets caused the fires that led to seizing of this town. The destruction of the railroad to the west of the station Buchach led to difficulty in evacuation of the enemy» [14, p.13].

Meanwhile the Commander in Chief of the Russian Southwestern Front, General A. Brusilov said: «One of the reasons that prevented the capture of Kovel, was that the Germans had a huge number of aircrafts that flew in squadrons of 20 or more units and entirely gave no opportunities our planes to conduct neither reconnaissance nor adjust firing of heavy artillery» [15, p. 208]. It should be stressed that despite all successes of development of aviation during the First World War, it only «met the interests of the Army on organization of operations in the proceedings of the infantry and artillery battle» [117, p.672].

Hence, the aviation became a real force which was impossible to ignore. The aircraft turned into a major aerial target, which forced the military experts persistently seek appropriate means of its detection and destruction.

In addition to aviation in World War I actively participated the aeronautic forces (aerostats, airships, balloons). For example, before the war in Germany was formed 9 field aeronautic units and 16 fortress aeronautic units. During the war, 8 field aeronautic units and 11 fortress aeronautic units were located on the Western Front, 1 field aeronautic unit and 5 fortress aeronautic units – on the Eastern. In August and

September 1914 field aeronautic divisions moved forward together with their army connections. During the campaigns of the German Army in Belgium and France the tethered observation balloons took an active part in the fighting [118, p. 157].

During the war Aerostats served primarily for the purpose of tactical reconnaissance: reconnaissance of enemy positions, artificial obstacles, observation of new fortification works, systematically observation of the movement on the roads in the nearest enemy rear (the movement of columns, carts, vehicles, artillery, systematic monitoring of railway traffic). The second task of aeronautic units was the maintenance of artillery, mostly heavy. Aerostats conducted the reconnaissance of the enemy batteries during their fire, determined their positions the number of guns and their caliber; systematically counted efficient batteries, adjusted the fire of own batteries at targets, which were not visible from ground observation points. The third task of aeronautic units was constant communication with their own troops: monitoring the movement of units and reserves during the attack, transmission of signals from the units to the command and artillery [17, p.7-8].

Effective combat use of aeronautic units caused a rapid increase their number in all armies of the parties who participated in the war, and on all fronts. For example, if at the beginning of the war the Russian Imperial Army had only 14 aviation companies, at the end of 1917 it had already 87 separate army corps and corps aeronautic detachments, two naval fortress aeronautic companies, 14 aeronautic divisions (units for supply special equipment and repair to aeronautic detachments) and 4 aeronautic parks (units of logistics supply) [102, p. 24].

It should be emphasized that the widespread combat use of aviation and aerial vehicles from the beginning of the First World War put to the armed forces of states that took part in the fighting, a new important task – protection against air strikes as troops in theaters of war actions and facilities in the rear of the country. Above all it was necessary to develop measures to protect all types of troops from damage

from the air to cover the troops and facilities in the front-line. The complex of such measures called «air defense». Different countries solved in their own way the problem that arose, however, regarding the measures to counteract attacks from the air during the First World War, in the all armed forces there was a general trend – at the front began a gradual transition from a decentralized system of subordination of forces and means of air defense by military units to centralization of their management in the army link.

In the first period of the war was set the task of hampering to enemy air scouts and their destruction, and then the destruction of aerial firepower. The troops, in order to avoid being detected by aerial reconnaissance, very soon learned various means of masking their maneuver and location in place ie passive protection from damage from the air. During the war of 1914-1918 years was widely developed a new branch of warfare – military field masking. Its techniques and means were aimed more likely to air surveillance and air photography.

At the same time, the destruction of air weapons, at about equal flying qualities and equal primitive weapons of aircrafts of different countries that were used in the first months of the war, was very complicated challenge. Actions against the aircrafts and aeronautics facilities from the ground at the initial stage were limited to their firing with the help of general rifles. Despite the lack of skills at low combat altitudes at which then flied aircrafts, such firing from time to time was effective. But with increasing of flight altitude of aircrafts this means of fighting began to be used only as an exception.

In addition, were also used field cannons. But soon turned out full inefficiency of such means, because the velocity of the air target required an appropriate speed of change of elevation angle of the cannon to 90 degrees, and rapid rotation of the gun barrel in the horizontal plane for circular firing at 360 degrees. Charging and aiming should have been carried out quickly



and easily. Furthermore, the entire system should be movable and have a special means of measuring the distance to the object of destruction.

Further flourishing of air defense methods was characterized by the formation of special units, consisting primarily of means of defense, which operated from the ground.

Because the night attack from the air damaged the troops, in July 1917 the anti-aircraft searchlight was put into armament. At the end of the war at the fronts and in the rear of Germany there were already 2 210 heavy and 356 light anti-aircraft guns [8, p.52].

Russia, like other countries, entered the First World War poorly prepared for confrontation with aerial enemy. The command at the fronts was forced to form quickly a battery, adapting the field 76-mm guns to fire at aircrafts. Batteries were formed of two, four, six or even twelve guns, which were fixed (to provide greater elevation angle of the gun barrel and rapid turning of guns) on the machines. But the hit in the aircraft with the existing methods was rather unexpected fortuity than skill. The origin of the Russian military air defense was related with the order of the Russian Emperor of 5 October 1914, which approved the necessity of forming a staff of separate automotive battery for firing at the air fleet. The battery was formed on 5 March 1915. The composition of battery included 78 servicemen and 4 special guns were located on the 5-ton trucks [7, p.10-11].

In the Russian army artillery tactical methods of air defense reduced to that in the vicinity of the disguised object, were arrayed 2-3 batteries. Anti-aircraft battery, usually, involved in the defense of large staffs, ferries, railway junctions, some railway stations and supply bases. The troops at the front mainly defended themselves from air enemy with the help of batteries and platoons that were allocated from the field artillery brigades. Attempts to engage the anti-aircraft batteries to defense of forces during offensive combat and on the march

were not successful because a lot of time was required to prepare them for firing [5, p.54].

In the «Instructions for commander of the field battery on the firing at aircraft» of 1917 was recommended to place the battery in two lines in a checkerboard pattern at intervals and distances of 4 km. At the firing position was recommended to place platoons of guns – in two lines at a distance of 30-60 steps. It was already a group location of guns, not linear, that was used before. The following scheme of air defense of troops in the field was developed in August 1917. The batteries should have been located in two lines: one line at a distance of 1.5 km, and the second – to 4 km from the line of front trenches, the spacing between batteries – 3-4 km. To defense of the shock groups of troops and their artillery was proposed to use the batteries with anti-aircraft guns of model of 1914 on horse or car. In addition, the automotive battery was recommended to use to indicate a large number of anti-aircraft batteries in order to deceive the enemy [4, p.51].

*Conclusions.* Thus it should be noted that despite the lack of special guns and mostly use of field artillery, anti-aircraft artillery appeared during the First World War. Anti-aircraft artillery of that time fettered the activities of enemy aviation and inflicted its significant losses. For example, the French military experts pointed out: «As a result of hostile countercheck the bomber activity of aviation during the day was limited by more and more narrow area. From September 1918 the day bomber connections could work only in a narrow front-line» [19, p.3].

About the efficiency of air defense during World War I testify the results of firing of anti-aircraft artillery of the leading country armies that took part in the fighting. So, with the help of the German artillery were shot down 1 588 aircrafts and 2 airships, English – 341 aircrafts [8, p.53]. French artillery destroyed 407 aircrafts, Italian – 179 aircrafts [20, p.15].

The use of aviation and means of aeronautics for military purposes caused the emergence of air defense. Aviation became the real force, which could not be ignored. This forced the military experts persistently seek the appropriate means of its destruction. Preparation for the First World War and the war itself gave impetus to the creation of anti-aircraft artillery.

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### **ВИНИКНЕННЯ І РОЗВИТОК ЗЕНІТНОЇ АРТИЛЕРІЇ В РОКИ ПЕРШОЇ СВІТОВОЇ ВІЙНИ**

Аналізується історія створення та розвитку зенітної артилерії в роки Першої світової війни. Вивчаються обставини появи нової військової техніки. Успішне застосування авіації у військових цілях напередодні і в роки Першої світової війни стало поштовхом до збільшення чисельності бойових літаків, а разом з тим розробкою зенітної зброї. Перша світова війна слугувала імпульсом для створення протиповітряної оборони і розвитку зенітної артилерії.

*Ключові слова:* історія зенітної артилерії, протиповітряна оборона, озброєння і військова техніка, Перша світова війна.

**Ткачук П.П.**

### **ВОЗНИКНОВЕНИЕ И РАЗВИТИЕ ЗЕНИТНОЙ АРТИЛЛЕРИИ В ГОДЫ ПЕРВОЙ МИРОВОЙ ВОЙНЫ**

Анализируется история создания и развития зенитной артиллерии в годы Первой мировой войны. Изучаются обстоятельства появления новой военной техники. Успешное применение авиации в военных целях накануне и в годы Первой мировой войны стало толчком к увеличению численности боевых самолётов, а вместе с тем – разработкой зенитного оружия. Первая мировая война послужила импульсом к созданию протиповоздушной обороны и развитию зенитной артиллерии.

*Ключевые слова:* история зенитной артиллерии, протиповоздушная оборона, вооружение и военная техника, Первая мировая война.