

POISON GAS

"...[W]ar has nothing to do with chivalry anymore. The higher civilisation rises, the viler man becomes."

~General Karl von Einem, Commander, German Third Army in France

Of all the scientific advancements made during World War I, the weaponization of poisonous gas may be the most notorious. Images of thick clouds descending upon troops as they choke and struggle for air are seen in the poetry and first-hand accounts of the war. The Germans were the first to use deadly poison gas in the war, but the tactic eventually adopted by both the Central and Allied Powers. Bis (2-Chloroethyl) Sulfide, commonly referred to as mustard gas, is probably the most discussed; however, mustard gas was only one of many toxic gases used in the war.

Tear gas, which irritates the eyes, was first used by the French in 1914. It was not very effective as a weapon, given that symptoms usually stopped in about 30 minutes. However, temporary blindness affected the soldiers' abilities to stay in battle. Blind soldiers would be escorted to a field hospital, where they remained for six to eight weeks, requiring nursing care until they were able to return to the field. The effects of temporary blindness created fear and reluctance in soldiers when they were told to return to the battlefield.

The next gas deployed in the search for the most effective weapon was chlorine, first used by the Germans in 1915. Immediately damaging the eyes, nose, and the lungs, chlorine was so deadly that it killed nearly 1,100 people in its first use alone. Phosphene was a chemical that also attacked the lungs and caused victims to suffocate slowly over a few days.

Unlike the previous gases that affected eyes, nose, and lungs, mustard gas is a chemical that causes burns and blisters all over the body. Masks could protect the eyes, nose, and lungs, but not the skin. Symptoms from mustard gas showed up a couple of hours after exposure and worsened over time. Most chemical weapon deaths during WWI were from mustard gas.

Gases were normally deployed by artillery shells. Soldiers wore masks to protect themselves, but some gas could penetrate masks. When gas made it through a mask, soldiers usually removed them, making themselves even more vulnerable. Besides causing severe and painful physical harm, gas became a psychological weapon. The symptoms were horrifying, striking fear into the hearts of many soldiers. Gas, which contributed to much of the anti-war sentiment that grew around World War I, was later prohibited when the League of Nations adopted the Geneva Protocol in 1925.

MACHINE GUNS

"They went down in the hundreds. You didn't have to aim." ~German soldier after the Battle of the Somme

While gas may have been the most infamous of weapons used in World War I (WWI), the machine gun caused some of the most drastic changes to the way wars were fought. Many hallmarks of the war including planes, tanks, and trenches, were directly or indirectly connected to the machine gun.

When WWI began, tactics generally revolved around offensive strategies. Previous wars had demonstrated that enough men with enough "spirit" could win a battle by gaining a good position and charging the enemy. The machine gun, however, turned war tactics towards defense. Weighing around 140 pounds and requiring several men to carry them, the average machine gun was used from a fixed position. These massive guns could fire between 400 and 600 rounds per minute, a number that increased as the war went on. Because of their capacity to fire enormous numbers of rounds, the machine guns would overheat and required cooling to keep them from jamming. Within just two years, gun manufacturers had created a lighter machine that was much more easily transported and could be mounted on armored cars, then installed on airplanes, where the invention of the interrupter enabled pilots to repeat fire from the air.

First offered to the British army, the machine gun was rejected because of its weight and its apparent bulkiness. The Germans, however, adopted this defensive strategy early on, while the Allies stuck to more offensive tactics. This strategy would cost them lives and time. By the time the war broke out in 1914, the German army had over 12,000 weapons at their disposal. Eventually, the Germans amassed over 100,000 machine guns. To maintain a constant defensive position, machine guns would often be grouped together. The fire power of a machine gun was estimated to be the equivalent of 60–100 rifles.

At the battle of the Somme, a conflict which ran from July 1 to November 19, 1916, the British leveled an offensive attack against Germany and attempted to cross no-man's land, the space between opposing trenches. By the time the battle ended, 419,654 British soldiers had been killed, mostly by machine guns.

Machine guns, along with artillery, created trench warfare, one of the defining features of WWI. Trench warfare received its name from the trenches that both sides dug deep into the ground to create areas safe from machine gun and artillery fire. Machine guns were also used in conjunction with other WWI advancements, like planes and tanks. Although originally manufactured in 1914 as a defensive weapon, improvements that reduced overheating increased the number of rounds that could be fired, and reduction in the weight of the weapon ensured that the machine gun would become an impressive offensive weapon.

AIRPLANES

“England is no longer, from a military point of view, an inaccessible island.” ~H.G. Wells

When World War I (WWI) began in 1914, airplanes were still a new technology. The Wright brothers had flown the first airplane just eleven years earlier in 1903. Over the course of the war, airplanes went from being highly limited in their functions to one of the major technologies of WWI.

Early in the war, most planes could only fly approximately 70 mph and sustain flight for about three hours. Both weaponless and slow, planes were used at first for reconnaissance: searching areas for enemy posts and returning with intelligence. However, this would soon change. Pilots started carrying handguns and single-shot rifles aboard and shot at each other in the air or dropped small bombs over the side of the plane onto enemy troops. These methods were relatively ineffective, so air combat wasn't a reliable tactic until machine guns were mounted onto the planes.

An obvious problem arose with mounting a machine gun onto the front of a plane: it fired directly at the propeller, resulting in a crash. This problem led to an essential advancement in aerial combat: the interrupter. The interrupter was a device that adjusted the timing of a machine gun so that it would only fire through the spaces between rotating propeller blades.

When planes became faster, machine guns were more widely used in aerial combat. Fighter plane pilots dueled in what became known as dogfights. As pilots gained skills and victories, they became known as aces. Their heroism was celebrated and used as propaganda in their home countries. Manfred von Richthofen, a German known as the “Red Knight,” painted his plane bright red and “downed” more planes than any other pilot in WWI. American Eddie Rickenbacker used his automobile racing fame into a reputation as the “ace of aces.” Known as a daredevil, he engaged a fleet of seven German planes, downing two before making a miraculous getaway. England's Albert Ball was a ferocious fighter in the air, engaging his enemies from below, using a tilting gun to shoot enemy planes out of the air. William Bishop, a Canadian, was known to German pilots as “Hell's Handmaiden” because of his outstanding marksmanship. He reportedly dropped tin cans from his cockpit and used them as targets as he dove toward the earth. Famed French aviator Georges Guynemer used a specially designed “single shot” cannon. He survived seven plane crashes until he was shot down and killed in a mission over Belgium. He was recognized for having downed 54 enemy planes.

By the end of the war, strategic bombing did not have the effect that both sides had wished for. Aerial missions turned out to be mainly tactical despite the notoriety of the dogfights. The airplane's major contribution for both sides was aerial photography and troop reconnaissance.

SUBMARINES

"We need the most energetic, ruthless methods which can be adopted." ~Field Marshal, German U-Boat Conference, August 31, 1916

When World War I (WWI) began, Britain's Royal Navy was the largest and most powerful in the world. A strategy of the Allied Powers was to cut off food and supplies from the Central Powers through a naval blockade, causing starvation and disease in those countries, especially Germany. Germany's response to blockades was known as unrestricted submarine warfare. Germany's submarines, called U-boats, were more advanced than the submarines of other nations. For example, their Type 93 class submarines had deck guns, carried sixteen torpedoes, and could travel around 9,000 miles. The British navy also developed a new kind of submarine. The enormous K-class boats were to serve alongside surface warships, but they were slow to submerge and impossible to spot once there were underwater. Those problems resulted in the accidental underwater collisions and the loss of five of the K-class boats.

Still, submarines proved to be an important new technology as deployable fighting vessels. Germany led the way in submarine technology and production. When WWI broke out in 1914, Germany had 30 ships. By the time the war ended in 1918, there were 350 in the fleet, with up to 61 at sea at any one time.

The U-boats wreaked havoc on enemy ships. Their goal was to cut off Allied supply lines and destroy their opponents' ability to wage war by laying mines in the Baltic, Black Sea, English Channel, and the Mediterranean. To stop the German submarines from entering British ports, the Allies created barrages of mines, nets, and surface boats. The German U-boats would snag the nets and drag them behind the vessel, making it visible and vulnerable. Barrages were successful in deterring German submarines from the English Channel and the straits between Norway and the Orkney Islands and in the Strait of Otranto.

The Germans' use of submarines against neutral ships angered the United States. Since German submarines attacked not only enemies but also merchant and passenger ships that often carried civilians, this was unrestricted submarine warfare. Germany justified the attacks on non-combatant ships because they carried supplies to the Allies. The 1915 sinking of the Lusitania, a passenger ship travelling from New York to England, caused such outrage that Germany briefly stopped unrestricted submarine warfare, but they resumed it again in 1917.

The Allied forces also incorporated submarines into their fleets, but in much smaller numbers than Germany. France had the largest number of submarines at 123. Russia had 41 and Italy had 25. England had 57, but 40 of those were only able to serve around the British coastline. The United States, who entered the war after Germany sank the Lusitania, had 72 submarines in its fleet.

ARTILLERY

"...I could hear these shells coming over, I really began to know what fear was..." ~Quiren M. Groessi, Company F, 5th Wisconsin Regiment

While innovations in planes, machine guns, and gas played a large role in World War I, artillery caused the most casualties. These weapons fired mortar shells packed with concrete and shells packed with pieces of metal called shrapnel. There were many variations among these heavy firearms. There were different sizes of shells, lengths of barrels, and distances and trajectories the shells could be fired. Some shells, like mortars, would be fired upward and arc downward to be dropped right into enemy trenches. Like machine guns, most artillery was fired from a fixed position. Along with machine guns, artillery was a factor in the development of trench warfare.

There were two kinds of artillery. Heavy artillery, which had the capacity to hurl giant shells across many miles, enabled soldiers to kill their opponents from a safe distance. Light artillery, however, was designed to cover shorter distances and do extreme harm to infantry. Heavy artillery was moved by tractor and placed in a stable place. Often several of these giant weapons were stationed together to increase the firing capacity. Howitzers were mortar-style weapons that had shorter barrels and were angled more steeply than light artillery weapons. The mortars they launched could destroy building and landscape miles away. These weapons could fire indirectly, the ammunition arching and curving, landing on the opponents from unexpected angles. The ammunition fired by these weapons were highly explosive, which detonated with incredible force when they met a solid surface like a building or the ground.

Light artillery could be carried by soldiers or secured to wagons and pulled by horses. Belgian and French soldiers often moved their light artillery in gun carts pulled by large, strong dogs. These weapons were more likely to use shrapnel, small pieces of metal and steel balls packed tightly into the shell casings, as ammunition. The explosive capacity was sufficient to propel the shells, but their purpose was to kill infantry by piercing the skin and breaking bones. The explosion propelled the shrapnel into the lines of enemy soldiers, doing extreme bodily harm.

Many newer technologies in artillery were used or improved in WWI. For example, the French relied on the relatively new 1898 invention of barrel recoil. Most artillery guns were forced backward each time they fired and had to be manually returned to their position afterward. Recoil technology used a barrel that included brakes which absorbed the force from firing the gun, allowing it to fire without being forced backwards. Heavy artillery, especially, contributed to the defensive nature of the war, as it was often fired from a fixed position to cut off enemy advances and fire upon other trenches. Light artillery was used to do maximum damage to soldiers in enemy sights.

TANKS

"It was rather terrifying to see this thing coming and you knew that you couldn't stop it." ~Andrew Bain, British Officer

With its focus on defense, trench warfare in Europe caused a kind of stalemate. The invention of the tank was an attempt to introduce a weapon that could roll through the countryside smashing whatever was in its way and destroying enemy trenches. It was the British who came up with the idea of a tank, or "land boat," as they called it. It was only called a tank to keep the idea secret from enemies, a name possibly chosen because the early models looked like a large tank made to store water. Originally thought to be the perfect weapon to maneuver enemy trenches, the tank had several problems. The weight and lack of traction stopped easy movement across the battlefield. Weapons designers eventually solved the movement and weight problem by adding caterpillar tracks. The vehicle could then move and have additional armor and armaments.

The first tank was invented by the British in 1915 and was named Little Willie. It was very slow and could not handle the rough terrain of trenches. Even its successor, Big Willie, also struggled to cross trenches. It was prone to malfunction and overheating. Slow moving and frequently unreliable, tanks went through major improvements throughout the war. For example, the Mark IV, introduced in 1917, could travel 4 mph (twice as fast as the Little Willie), had four Lewis machine guns and two 6-pounder guns.

Mark IV was a "male" tank. "Male" tanks weighed 32 tons and were equipped with 6-pounder naval guns and four Lewis machine guns. "Female" tanks weighed 28 tons and were equipped with six Lewis guns. British tank commanders typically preferred a male tank to a female tank because of the additional weight and added armaments. The first machine gun to be fired from an aircraft, the Lewis machine gun was the weapon mounted on British tanks. Known as the Belgian Rattlesnake, it was able to fire 500-600 rounds per minute. It weighed 28 pounds, about half the weight of other tanks. Germans, who came into combat with the Belgians in 1914, called the Lewis the "Belgian Rattlesnake" because of its rapid and accurate fire.

The design of tanks went through many versions before they were battle-ready. They were launched in September 1916 at the Battle of the Somme. Of the 49 tanks first launched, only 32 made it through the first attack and nine made it across "no-man's land." The first battle where tanks made a great impact was in 1917 and by 1918, the French deployed almost 500 tanks. The first tank-versus-tank battle took place in April 1918 when three German tanks engaged three British tanks. The Allies tanks did not fare well in battle though, and the Australian infantry brigades pushed the Germans back. Despite the effort and engineering put into tank design and manufacture, battle was won mostly by infantry in hand-to-hand combat using traditional weapons. It wasn't until WWII that tanks became a prominent and powerful force rolling menacingly across many fields of battle.

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