The Evolution of Artillery

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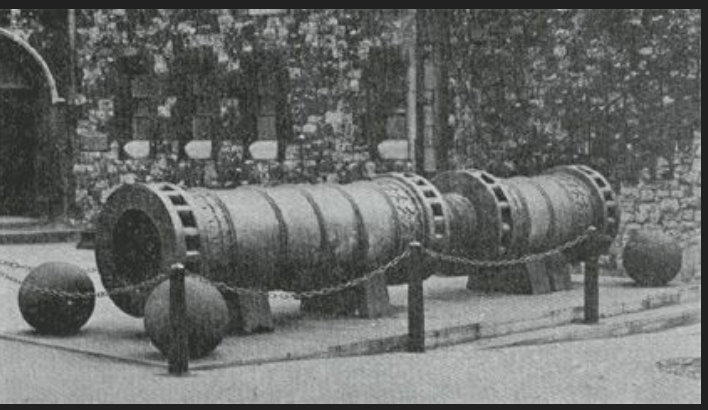
Artillery has been the King of Battle since its first use in 1343 at the siege of Algeciras, since then it has been used to kill and injure millions. Bringing death and destruction from unseen positions kilometers away. The guns have gone through significant adaptations throughout the years in addition the support structures have changed too leading to complex and well oiled killing machines.

illustration of artillery emplacements from this era.

Artillery was made to solve a simple problem yet has evolved to solve almost all problems from softening hard targets and providing support for those on the ground and even precision strikes. The problem was that castles and their walls could withstand bombardment from the weapons of the time, trebuchets and catapults were at the end of their line. Europe looked east where China had discovered gunpowder and had begun using it to build fireworks along with simple bamboo guns. The quick and powerful reaction of gunpowder gave the European engineers a method to launch cannonballs, replacing catapults and trebuchets quickly.



Dardnanelles Gun, cast in 1464

These early guns were muzzle-loaded smooth bore cannons with limited mobility and relatively short range, the guns often had to be put onto multiple horse drawn carts. With projectiles ranging from smaller 50kg projectiles to over 500 kg siege projectiles designed to punch through castle and city walls. These early guns were inaccurate therefore they were not often used on infantry. Even in these early times one can see how modern tactics evolved from the practices of the era and each evolution of the guns seems logical. Increasing accuracy and decreasing reload times.

The Birth of the Field Gun

With the early successes of artillery and the concept proved, strategists wanted to make better use of them everywhere. In 1453 at the battle of Castillion the French used 300 cannons against the English to great effect, this battle marks the birth of field artillery. Instead of the guns taking multiple horse carts to move them at a slow pace these guns need only 1 horse cart. Like the machine gun in WW1, these new guns had a rate of fire that was unmatched by any other gun of the time but still are just a drop in the sea compared to modern guns. From 1450 to mid 1500s the estimated rate of fire from these guns was a round per hour, compared to the earlier times of the 1300s when each round took hours to load this was a big change. It was this innovation of more mobile guns that led to the creation of the stereotypical field gun used later in the Napoleonic wars.

Illustration of the battle of Castillion.

Napoleonic Wars Artillery

Napoleonic era breech loaded gun

Grapeshot

This era of guns developed rapidly, leading to pre WW1 artillery and tactics. These tactics involved flanking infantry columns and formations to fire diagonally upon them, softening and breaking the formation for your own infantry to mop up and push through the opposing lines. Very similar to modern doctrine. These guns were where unique ammunition was starting to get used, one such ammunition was grapeshot. A collection of golf ball sized projectiles bunched together with rope and canvas, looking like a bundle of grapes. These projectiles spread across a wide area in front of the guns tearing through anything and anyone it comes in contact with, the most famous use of these rounds was when Napoleon used them to quell an uprising in 1795. The biggest game changer of this era was the addition of the breech to the guns, lowering reload times by minutes, instead of having to ram the charge and round down the barrel it could now be inserted into the breech and chamber. This also led to the increase of rifled guns which resulted in more accurate fire and more effective use against moving targets such as moving/advancing formations of troops.

Victoria’s Coastal Defense

A gun currently located at Fort Rodd Hill

It is around this time that large coastal batteries were built like those found around Victoria and Metchosin constructed around 1870. These batteries were manned by the local Coastal Defense militia which later formed the 5th Field Gun Regiment. The battery positions are still visible today at Fort Rodd hill, Macaulay Point, Albert Head and CFB Esquimalt. The guns used were large bore, breech loaded anti-ship guns, they carried special ammunition to designed and crack the hulls of ships to maximise damage. Luckily Victoria never had to use these guns and once the threat of naval invasions ended the batteries were dismantled and the positions handed over to Parks Canada.

A gun from HMCS Rainbow placed at Macaulay Point in 1924

World War One

It is impossible to talk about the evolution of artillery without mentioning World War 1, this is when the world saw what man can do to another man with millions dying directly from Artillery and many more dying indirectly from it. 1.4 billion shells were fired in 4 years, that's 958 thousand every day or 1300 for every kilometer every day. This big change came from the introduction of telephone lines to the artillery structure, allowing spotters to see where the rounds are landing and communicate back to the guns that are hidden from the enemy.

Shell casing pile from the battle of the somme, 1916

These practices produced more accurate and destructive fire than pre WW1 tactics could achieve. It was during ww1 that some absurd gun designs started to appear such as the "Little David" mortar, a 36 inch behemoth developed by the USA, Although it was never put into active service. Different types of fuses were developed at this time. The nature of trench warfare meant that shells that exploded on the ground weren't effective at taking out the entrenched infantry. To fix this dilemma, timed and proximity fuses were introduced. These fuses made the shells more effective at spreading shrapnel and splinters down into the trenches rather than straight over them by exploding above the trench. point detonation fuses were still used to destroy physical fortifications before assaults. During the early months of the war Canadian artillery regiments still used the flanking maneuvers seen in pre WW1 doctrine, this resulted in massive casualties on the Canadian side and minimal effect on the enemy. Canadian gunners and commanders quickly adopted the more stationary tactics as seen throughout the rest of the war. With the ending of WW1 many weapons also came to their retirement, the age of large siege weapons was over.

Early Self-Propelled Guns

A Hummel at the battle of Kursk 1st July 1943

In the opening months of WW2 the Germans made use of high speed combined arms warfare, along with their tanks and infantry they also had a support system like none other. Self-propelled artillery came into the world in the form of the Hummel 15 cm Self propelled howitzer, an incredible innovation allowing the tank and troops to push deep into the enemy's country without ever leaving the range of their own guns. But the Germans didn't stop there, they went on to develop the Sturmtiger after the allied forces landed in France. The Sturmtiger was a self propelled 38cm rocket propelled mortar, designed to break through any defensive line that the invading allied forces set up. Fortunately the Germans were not able to deploy it successfully, effectively proving the concept un-usable in modern battle.

Sturmtiger with one of its shells placed in front

World War 2 Field Artillery

British 25 pounder

US M2

Truck towed artillery took off though, used by both sides resulting in rapid development for the guns. The famous 88mm German gun and the 25 pounder British design along with the American M2 105mm. The 88mm was used in all roles in the German forces, both as anti-air, anti-armour, artillery emplacements and the main gun on the Tiger 1 series of tanks. The 25 pounder is considered one of the “winning weapons”, a list of weapons that historians directly link to the major victories, such as the battle for Caen, leading to the end of the war. The M2 105mm was put into similar roles as the 25 pounder but with the typical American twist, having heavier rounds, longer range and a larger kill radius.

German 88mm

Early Rocket Artillery

Katyusha battery firing

It was during this time that the Soviets began playing with rocket artillery, leading to large batteries of rocket trucks firing many rockets further and faster than any other conventional guns of the time. The rocket artillery led to an iconic and terrifying sound of them being fired and flying overhead, sounds still heard in Ukraine today. The Katyusha system held 16 132mm rockets and carried 5 Kg of high explosives, able to fire them in quick succession leading to a more destructive and effective barrage. As the war carried on, more and more countries developed their own versions of the Katyusha; the Americans developed the Calliope, a Sherman tank with rocket launchers jerry-rigged to the roof of the turret. The Germans converted one of their half-tracked Mule vehicles into a rocket artillery vehicle. The Brits developed the Mattress, a towed system that looks as sketchy as it sounds.

A Calliope Firing During testing

A Mattress system reloading during the Normandy campaign

A panzerwerfer

Korean War Era Self Propelled Guns

M44

As WW2 came to a close it became obvious in what direction artillery was going in, in the early 50s the American M44 was developed, a self propelled 155mm gun. It saw extensive use in Korea. The design was quickly bought by many western nations, it was then developed into the M55. The M55 included a completely enclosed turret, a more accurate gun and improved mobility, but these developments were entirely overshadowed by the improvements and development of rocket artillery. Although they still used the same vehicle designs as the WW2 versions they packed more punch and were more accurate. This era of development is often under-appreciated when discussing the development of weapons as most historians would much rather talk about Vietnam. The 50s is where modern self propelled gun (SPG) doctrine originates from, it is also when towed artillery became more common in the role of support from bases and outposts unlike the mobile warfare seen in WW2.

M55

Semi Modern Systems

After Vietnam, artillery came into its own, no longer restricted by the jungles of southern Asia or the mountains of the Korean peninsula. The US made M109 and the Soviet made 2S1 self propelled howitzers became the go to as both had high export numbers, both were incredibly mobile systems with their own specially designed support vehicles. The most famous of these support vehicles is the M992 support vehicle, built off the same chassis as the M109 but being lighter and faster meant that the guns could never out run the supply chain. Built for moving ammo from the rear to the guns as quickly and safely as possible. During this time the M777 howitzer, a towed system, was being put through its paces as a less mobile support system, becoming the gold standard for towed artillery used by 7 countries and the base system for many more countries' artillery. With digital displays and a quick and simple set up and tear down, it has served in every major war since Vietnam. Of course the soviets couldn't be out done, so they developed another SPG, the 2S19 was put into service in 1989. With a fully incorporated fire control system and auto-loader meaning that this system can put 6 rounds down range every minute, compared to the M109 with only 2 rounds a minute. These discrepancies on paper lead to the Germans developing their own system, replacing the M109.

M109

2S1

M777 being operated by Canadian gunners

2S19 operated by Russia in Ukraine

Modern Systems

PZH 2000 section during a joint NATO exercise

The German PZH 2000 is an independently developed artillery system built for maximum effectiveness against the Russian 2S19. With an auto-loader and even more advanced fire control it can fire 3 rounds at 3 different trajectories to hit 1 target at the same time, often called the king of artillery it trumps every other system of its time, built in 1995 it has only recently come under threat by a new system. Similar in the fact that it has an advanced computer system for aiming and its autoloader, the Swedish Archer system surpasses the PZH 2000 in every aspect. Designed for shooting and scooting it is able to fire 6 rounds in 30 seconds, the time from stopping and firing is anywhere from 15 to 25 seconds. meaning an entire fire mission can take place in a minute and a half, from stopping to moving again. In some cases the Archer will be out of its position before the rounds have hit their target. Along with the fast deployment speed and firing time, it tops out at 70kmh.

Archer system during shoot and scoot drill

HIMARS and MLRS

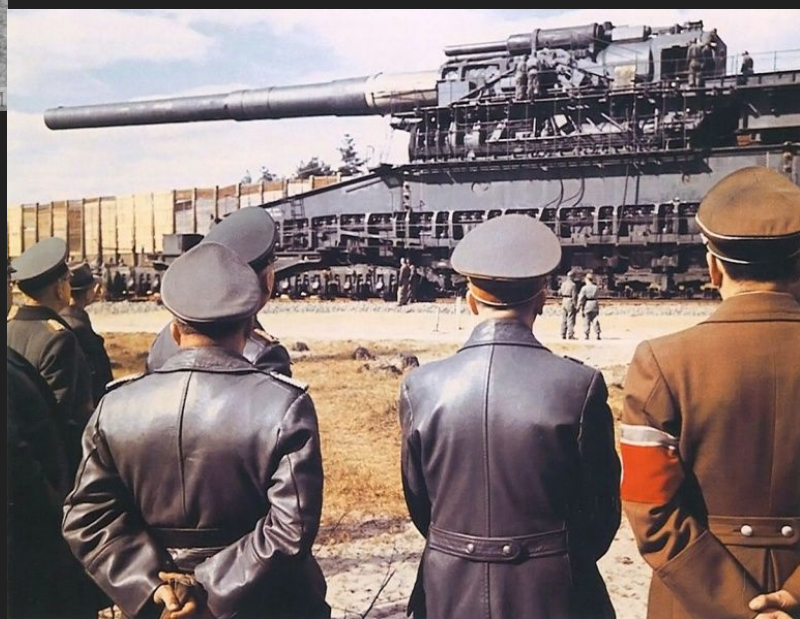
The HIMARS built by Lockheed Martin has become the gold standard for all missile and rocket artillery systems, with the ability of precision strikes up to 500 km it is indispensable on the modern battlefield. Unlike the older rocket artillery of WW2 and the cold war these new systems are not used as a conventional artillery substitute but instead have become the go-to for high value targets deep in enemy lines. The HIMARS focuses on strategic level strikes rather than doing standard support style missions.

A HIMARS doing in garrison training

Wonder Weapons

Like all weapons of war there will always be a few cases of “super” weapons, in the case of artillery there are 4. The Paris gun was the first, a gun built in 1918 by the Germans to hit Paris from as far away as possible, this lead to the gun being built 120 Km from Paris where it routinely hit Paris during the last year of the war. The second was the Schwerer Gustav Gun, also a German built weapon entering service shortly before the start of WW2, it was used to destroy fortifications along the Maginot line and later in the siege of Sevastopol. Lobbing 80 cm shells up to 38 km. The largest artillery piece to ever see combat, the Gustav weighed 1350 tonnes and required a double rail system to move as it was a train gun.

Paris Gun



Schwerer Gustav gun being inspected by Hitler after construction and testing

The 3rd gun and final gun built intended to be used in combat was Project Babylon, an Iraqi gun built to launch large guided projectiles from a fixed position. With a range of 750Km it could have become a serious threat if the project was ever finished. The prototype, Baby Babylon, was destroyed in 1991 by UN forces. The final one was not used for combat and was never intended to be used for combat, instead it was used to launch payloads into space. Project HARP was designed by Gerald Bull, the same designer as Project Babylon. Using a 16 inch naval gun operated by the US army's ballistic research laboratory and funded by both the US department of defense and the Canadian Department of National Defense, the research team was able to launch a projectile up to 180 Km above sea level from the launch site in Barbados. Project HARP remains the record holder for highest projectile ever fired from a gun. The Project ended in 1967 after Canada withdrew its funding.

2 Barrel Pieces of Baby Babylon bolted together at Fort Nelson in Portsmouth

Project HARP fring what would be the record breaking projectile

The Mental Effects of Artillery

It is important to note the effects of artillery on the morale of those fighting in the wars where it is used. Knowing that at any point a shell could rain down without warning and blow up everything around you is scary. It defines how the war is fought, whether it will be a fast mobile war or a slow war of attrition like the first world war. The morale of troops always decreases when the threat of artillery is introduced, not just from being on the receiving end of a terrifying weapon but knowing that the operators of the guns often act without consequence. Crews are able to fire the rounds and hunker down unlike those the weapon is used against.

Long exposure image taken by a British Photographer 1917

Conclusion

It is safe to say that artillery is and forever will be the King of Battle, as through the years it has not only kept up with the development of war but also caused other weapons to catch up with it. With a detrimental effect on morale and the bite to match its bark, it has been a key weapon in every war it is used. As long as artillery remains well maintained and supplied it is the most effective killing machine man has ever made.

US Marine Corps M777 and crew firing during an exercise

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