

GATLING: The Man and the Gun



By

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CHAPTER 1: Dr. Gatling

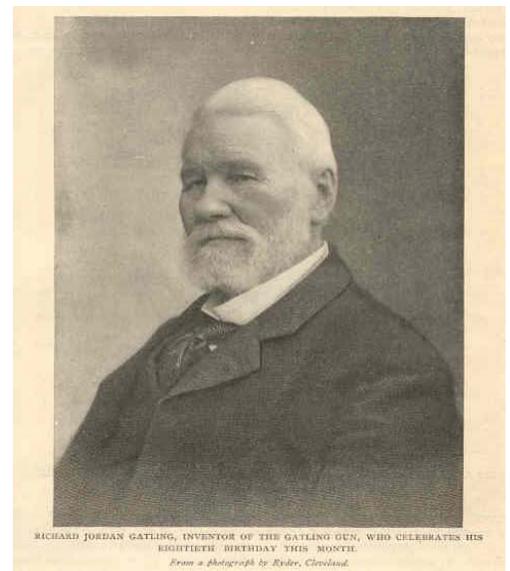
On November 4, 1862, Dr. Richard J. Gatling introduced the first really practical and successful machine gun. The "Gatling Gun" was a hand-cranked multi barrel weapon which was used by the United States government until 1911. The Gatling Gun started the trend of high powered weaponry. Dr. Gatling was a gentle man who thought that the invention of his gun would make warfare so devastating that men would not fight anymore.

Richard Jordan Gatling was born on September 12, 1818 on his father's farm in Hartford County, North Carolina, near the Virginia border. Both of his parents, Mary Barnes and Jordan Gatling, were descended from English colonists in North Carolina. His father had invented a machine for planting cotton and another for thinning the plants to a stand. Young Richard Gatling helped his father construct these machines and eventually was granted his own patent for a rice planter. Dr. Gatling believed that there was more money to be made in the north so he adapted his rice planter to handle other grains and moved to other cities in Indiana, Missouri, and Ohio. In 1844 Dr. Gatling came down with small pox which was regularly sweeping the country.

In 1847 Dr. Gatling enrolled at the Indiana Medical College in LaPorte. In 1849 he entered the Ohio Medical College in Cincinnati where he received a medical degree in 1850. There are no records of Dr. Gatling ever practicing

medicine and it is claimed by many that he only became a doctor to protect his family from small pox.

In 1861 Dr. Gatling lived near a railroad depot in Indianapolis. He witnessed the young volunteers being shipped out to fight in the Civil War. He also saw the bodies of the dead being brought back for burial. On one occasion he noticed that of the 19 corpses shipped home only three had been hit by bullets. There were far less soldiers killed in battle than those who died from sickness.



In 1877 Dr. Gatling wrote a letter to Lizzie Jarvis, a niece of the late Col. Colt, and expressed his reasons for designing his gun.

"It occurred to me that if I could invent a machine - a gun - which could by its rapidity of fire, enable one man to do as much battle duty as a hundred, that it would, to a large extent supersede the necessity of large armies, and consequently, exposure to battle and disease [would] be greatly diminished."¹

In 1864 Dr. Gatling sent out flyers to Union generals and politicians in which he stated the moral and mechanical values of his gun.

¹William, Bennett Edwards, "Dr. Gatling and His Gun", American Rifleman, April 1990, pages 24-25.

"It is confidently believed that no body of troops could be made to withstand the fire of such a death-dealing weapon, for the reason that men will not fight on such terms of inequality, or when there is no chance of victory The great object to be attained, and which every patriot should have at heart, is to crush the rebellion, and to do so, with the greatest possible savings of life and treasure. How can this be done? Only in one way - by crushing the military power of the rebellious states - and the same means of accomplishing that result is to strengthen our armies; and the way to do that, is to arm our soldiers with this gun."²

On February 26, 1903, Dr. Richard Jordon Gatling passed away at the age of 84. He had been an active businessman and inventor up to the morning of his death. That morning he walked from his son-in-law's house in New York down to the office of the editor of Scientific American. Upon returning he decided to take a nap. His granddaughter, Peggy, described his last moments with her when she was 16 in a letter to William Bennett Edwards dated August 15, 1957.

"As was his custom, he said he would have a cat nap before lunch. He cat napped all thro' his

²William, Bennett Edwards, "Dr. Gatling and His Gun", American Rifleman, April 1990, page 65.

life. He seemed very old to me, but alert and with a twinkle in his eyes. I covered him up on the couch in my father's study, and left him to snooze, and went down the long hall of the apartment to join grandmother at our lunch. They had been living with us for some time. I believe at that time grandfather was out of money, as he had been spending it to develop a new large gun I remember hearing about.

While at lunch the phone rang in my father's study, and I ran down the hall to answer it. It was the old wall type. As I lifted it off the hook, I glanced at grandfather and he seemed to be gasping for breath. It proved to be father on the phone, and I asked him to hold on, as grandfather was on the couch and looked queer to me. I went to him and lifted up his shoulders. In my arms he gave a big sigh and collapsed in my arms. Somehow I knew he had died. I told my father on the phone that grandfather had just died. He passed away as gently as he lived, for I remember him as gentle voiced, and sweet natured."³

³Edwards, William Bennett, "Dr. Gatling and His Gun, American Rifleman, April 1990, Page 66.

CHAPTER 2: Model 1862 & Function

It is rumored that Col. R. A. Maxwell suggested to Gatling that a special purpose weapon was needed, and it was because of this suggestion that in 1861 Gatling started drawing up the plans for his gun which he received a patent for in 1862. The gun was designed for the defense of buildings, causeways and bridges. Although the first model was crude in comparison to the later models, it was still one of the most extraordinary actions in firearm's history.

Dr. Gatling's original design, the model 1862, can be classified into two types. The weapon used features of the Ager and the Ripley guns. From the Ager gun, Gatling used the idea of using steel cylinders to hold a percussion cap, powder and a .58 caliber "mini ball". The cylinders could be loaded using the .58 caliber paper cartridge or individual components. When loaded into the gun these cylinders acted as the breach end or chamber of the .58 caliber musket barrels. The gun consisted of six barrels that were fastened to front and rear steel disks forming a cluster. This cluster had a center shaft running through the middle. The shaft runs out the rear of the barrel cluster and through a cylindrical block of bronze called the breach block. This block had six u-shaped troughs in the front half of the block that line up with the barrels. Behind the troughs were holes which house the bolts.

The purpose of the U shaped troughs were to pick up the

steel cylinders carrying them through the process of being seated up against the breach of the barrel, fired, then ejected. After this the trough would pick up a fresh cylinder. The bolts, which are the part that pushes the cylinder up against the breach, also house the striker and spring, which is what fires the cylinders. The striker had a lug on the side of it which would be caught and retracted by the cocking ring. When the bolt was pushed fully forward by a stud in the back plate and the barrel was at bottom dead center, the sear slips through a slot cut in the cocking ring which allows that barrel to fire. The center shaft runs out the breach end of the carrier block and through a bearing in a plate in the back of the breach housing. The shaft ends after this with a gear on the end. This gear meshes with another gear attached to a shaft that runs perpendicular to the center shaft. This shaft ends with a crank on it which is used to fire the gun.

The breach housing had two slots cut in it, one on top and one on the left side down to the bottom. Above the slot on the top sat a steel hopper which the charged steel cylinders were loaded into. This would drop the cylinders down into the breach block as needed. The opening on the left side let the spent cylinders fall to the ground where they could be picked up and reloaded. The breach housing was fastened to two frame rails, one on each side which ran forward out past the front of the barrels. They were joined

together at the front by two semi-circular pieces of steel with a bearing in the center which the center shaft passed through with a nut on the end.

As the crank was turned, the barrel on top, whose bolt was in the rearward position, would receive a fresh cylinder from the hopper as that barrel rotated around. The bolt would move forward pushing the cylinder up against the back of the barrel while the striker was drawn back. When the barrel reached the cocked position, the striker would be released, hitting the percussion cap and igniting the powder, forcing the minie ball down the barrel and out. As the barrel rotated up, the bolt would be unlocked and the fired cylinder ejected. When the barrel reached the ten o'clock position, it was ready for a fresh cylinder. For each revolution, each barrel would fire one round, which with the gun having six barrels could fire six rounds per revolution of the barrel cluster. This feature was very important in that it allowed the barrels to cool after being fired which becomes very important as the rate of fire increases.

One of the oddest features of the gun is that the bore of each barrel is tapered from largest at the breach to smallest at the muzzle. This was done in an attempt to compensate for the mismatch between the barrel and the cylinder. This turned out to be a very unsuccessful attempt in that a lot of the minie balls that were recovered after

firing showed no signs of engraving marks from the rifling. When the targets were inspected it was evident that the rounds were hitting the target sideways.

By the Spring of 1862, Dr. Gatling was satisfied that his prototype was good enough for a demonstration. The demonstration was conducted in Indianapolis before thousands of people. The spectators included Army officers, citizens, and government officials including the Governor of Indiana, the Hon. O. P. Morton. The gun fired at a rate of 150-200 rounds per minute. The Governor was so impressed with the demonstration that he wrote to P. H. Watson, the Assistant Secretary of War. Even though this letter did not help Gatling sell his gun to the military it did encourage him to further develop his design and seek financial backers.

In November 1862 Dr. Gatling received his first of many patents on the Gatling Gun. He soon received his backing and went to Cincinnati, Ohio where he contracted Miles H. Greenwood and Company to produce six guns at their Eagle Iron Works Factory, the largest of its kind in the west. The guns were finished in the Summer of 1863. After Dr. Gatling paid the \$6,000 for the guns, he returned to his hotel room expecting to take delivery of the guns the next morning and go on a selling trip. That night the Eagle Iron Works Factory burned to the ground. His guns, patterns, and drawings were all destroyed. The six guns were melted down into brass blobs from the fire.

Even though the guns were destroyed, an interesting story exists about Gatling guns being used to defend the New York Times building during the Draft Riots of July 13-16, 1863, during which the mob of 50,000 people caused 1,000 deaths and \$2,000,000 in property damage.

“While others cowered in fear of mob violence, Henry Jarvis Raymond, editor of the New York Times and a prominent Republican politician, was prepared to fight. Daily, he blasted the mob in flaming editorials in the Times. Brightly illuminated by night, its plate glass windows gleaming a challenge to the mob, the imposing Times Building, an arrogant symbol of wealth, seemed to dare the rioters to attack. Raymond, who advised ‘Give them grape (shot), and plenty of it.’ was quite ready to do so. Inside the two northern windows, commanding the most likely avenues of attack were mounted Gatling Guns, manned by Raymond himself and Leonard Walter Jerome, a major stockholder of the New York Times (and future grandfather of Winston Churchill). A third Gatling was on the roof of the building, in position to sweep the streets below. The entire staff of the newspaper had been equipped with rifles and stood ready for the attack that might have come at any moment. The Times was waited for

the mob-Messrs. Raymond and Jerome probably would have like nothing better than a chance to play Gatling music for the rioters' edification-but the attack never came. Learning that the Timesmen were well armed, the mob directed its attentions elsewhere. As it was to do many times in future years, the Gatling Gun had served well-without firing a shot."⁴

It is unknown where the Gatling Guns used to defend the New York Times could have come from. The rumor at the Times is that President Lincoln, a friend of Mr. Raymond, made the guns available. This story is unlikely because at the time the government had no Gatling Guns. It is more likely that Dr. Gatling or an associate was in New York for demonstrations and made them available. It is believed that at this time the only Gatling Gun that existed was the original prototype.

Even after the loss of the \$6,000 and the guns, Dr. Gatling was not discouraged. After a very short time he received backing from McWhinny, Rindge and Company who started building twelve guns.

Shortly after the twelve guns left the factory, Dr. Gatling, in an attempt to improve his gun redesigned it. The new design used copper cased rim-fire ammunition instead of the paper cartridge and percussion cap. The copper cased

⁴Wahl, Paul and Don Toppel, The Gatling Gun, Arco Publishing Company: New York, NY, 1978, pages 24-25.

ammo was still loaded into steel sleeves but it made reloading the sleeves much easier and faster. This change made it necessary to put two small projections on the end of the striker in order to fire the cartridge. This design is known as the Model 1862 Type II.

A few days after General J. W. Ripley, Chief of Ordnance, flat out refused Dr. Gatling's request for test trials of his gun, one of Dr. Gatling's representatives met Gen. Benjamin F. Butler. General Butler was asked permission to witness a demonstration. The General was so impressed that he purchased all twelve guns on carriages and 12,000 rounds of ammunition for \$12,000 out of his pocket. General Butler personally oversaw the use of the Gatling Guns used during the siege of Petersburg, Virginia.

CHAPTER 3:Early Gatling

In the Fall of 1864, Dr. Gatling started working on improvements to his gun focusing on problems that had appeared during tests. When Dr. Gatling completed his design changes in the first part of 1865, he ended his partnership with McWhinny, Rindge and Company. He then set up a contract with the Cooper Firearms Manufacturing Company of Frankford, Pennsylvania to produce his improved gun.

On May 9, 1865, Dr. Gatling was granted U. S. Patent No. 47,631 on the redesign of his gun. The improvements were the elimination of the separate chamber and reciprocating breach bolts.

The junction between the barrel and separate chamber on the model 1862s would let gas leak out which would effect muzzle velocity and foul the action. The new design eliminated the problem and the need for a tapered bore by having an integral barrel and chamber. This modification was a great benefit in improving accuracy along with eliminating the need of keeping track of the separate cylinders.

Because of the integral barrel and chamber, a design was needed to chamber the live rounds and extract the fired cases. For this, Gatling came up with the ingenious idea of reciprocating breach bolts. Each bolt had a lug that projected out the side of the bolt. This lug rode in a deep heliocoil grove that was machined into the inside surface of

the breach casing. As the bolt revolved with the barrel cluster, the bolt would be moved forward and backward by the lug and heliocoil track.

The bolts were fitted with a long narrow piece of spring steel with a claw on one end. The claw was positioned to overhang the front of the bolt so it could grab the rim of the fired case and pull it out of the chamber.

The cycle of the actions of the Gatling Gun was as follows. Looking at the gun from the rear, the barrel at the 12 o'clock position would have its bolt fully to the rear. The magazine would drop a live round into the loading trough. As you turned the crank, the barrel cluster would turn in a clockwise direction. At the two o'clock position, the bolt would start to move forward to chamber the round. By the time the barrel reached the five o'clock position, the bolt was closed, locked, and the round fired. At the seven o'clock position, the bolt would have unlocked and started to move backwards. By the ten o'clock position, the bolt would be fully to the rear and the round ejected.

In 1866, Dr. Gatling was awarded a contract by the United States Army for 100 Gatling guns. Fifty of the guns were to be chambered in .50/70/450 centerfire infantry cartridge. The designation for this cartridge meant a fifty caliber bullet that weighed 450 grains and a seventy grain charge of black powder. The other fifty guns were to be in

one inch caliber. This round had a 2 5/32 inch copper case, a 3/4 ounce charge of mortar powder, and an 8 ounce conical lead bullet. For this contract, Dr. Gatling moved production to Colt's Armory in Hartford, Connecticut, where the Gatling Guns were made for the next four decades.

This model had six barrels but a few were made with ten. The steel breach housing had a bronze plate on the top that had Colt markings and Gatling's patent dates printed on it. The gun was equipped with opened sights which were centrally located on the breach housing. When not in use, the rear sight could be retracted into the casing. The gun was mounted on a yoke on an artillery carriage. The elevation was adjusted by means of a jackscrew that was at the rear of the gun. Horizontal movement could only be achieved by moving the carriage. The fifty caliber gun weighed 224 pounds alone and the carriage and timber weighed 202 and 200 pounds respectively. The one inch caliber gun weighed 1,008 pounds.

Ammunition was fed into the gun from a gravity-feed magazine. The magazine was made of tin and was a rectangular shape with an opened bottom that fit into the mouth of the feed hopper. The magazine had a detachable cover to keep the cartridges in when being stored.

In 1868 Colonel A. Gorloff of the Imperial Russian Artillery came to the United States to oversee the production of Gatling Guns for the Russian Army. In 1868

and 1869, Col. Gorloff spent a lot of time at Colt conducting tests and making improvements to the Gatling Gun. When Col. Gorloff was satisfied with the design he promptly ordered seventy guns at a price of \$1,500 each. Col. Gorloff contributed more to the development of the Gatling Gun than any other foreign officer. In the 1870s, the Russians started production of Gatling Guns in their own arsenals. The Russian newspapers said that Col. Gorloff had invented the gun and called it the Gorloff, but Col. Gorloff never claimed to have invented the gun.

On February 28, 1871, Dr. Gatling was granted another patent for a number of improvements which were incorporated in the model 1871. Despite much testing of the model 1865 prototypes, some shortcomings revealed themselves after the gun had been in service for a while. The new improvements were designed to take care of these shortcomings.

The first change was to the bolts. The bolts in the model 1865 were cylindrical in shape and were smaller in diameter at the front which was unsupported. The bolts in the model 1871 were the same diameter the entire length of the bolt with a support rib along the bottom of the bolt. The bolts were also made heavier in construction to make them more durable.

A major disadvantage of the model 1865 was that if the bolts had to be removed, the whole back of the gun had to be removed. This was a job that required a skilled armorer and

could not be performed in the field. To solve this problem, the model 1871 had a port in the cascable plate which had a locking plug fitted to it. The bolts could be easily removed without the use of any tools through this port. This was an important improvement because it allowed the gun to be cleaned in the field which was frequently needed.

The magazine was replaced by a curved magazine that used a heavy brass weight to aid in feeding. A manually operated spring latch that would hold the cartridges in was later added to the magazine.

Another patent was granted on April 9, 1872, for a new type of magazine and an automatic oscillator. The magazine was designed by L. M. Broadwell who was an employee of the Gatling Gun Company. The magazine consisted of twenty vertical magazines of twenty rounds each set up in a circular cluster. As each one of the magazines was exhausted, the gunner would rotate the drum to the next magazine.

The other improvement covered by this patent was the automatic oscillator. This device was a rotating multitracked cam at the end of the crank shaft. As the hand crank was turned, it would cause the gun to swing 12 degrees from side to side. At a range of 1,200 yards, the field of fire would cover an area 62 feet wide.

The model 1871 had ten barrels but could be ordered with five or six barrels. Eight model 1871 Gatlings in .50

were ordered by the U. S. Navy. Guns in different calibers and number of barrels were sold to Holland, Russia, and Tunis.

Chater 4: Classic Gatlings

The model 1874 was considered the first of the "Classic Gatlings". It was smaller and lighter than any previous models. The hopper and breech housing were made of bronze on the model, which also made it much nicer looking than past models.

The .45/70 cartridge was adopted as the standard cartridge for the model 1874. A newly developed smaller breach bolt made it possible to make the breech housing smaller in diameter and length. This of course made it lighter in weight.

The 1874 used a new type oscillator, Patent No. 145,563, which could be set to swing the gun from side to side as on the 1871. It could also be used to manually adjust for windage instead of moving the carriage.

Gatling Guns had always had a problem with headspace, which is the distance between the bolt face and the breech face of the barrel. The model 1874 had an adjustment screw that ran through the front of the frame and beared up against the center shaft of the barrel cluster. By tightening or loosening the screw you could increase or decrease the amount of headspace. This turned out to be a bade idea because someone had to stand in front of the gun to adjust it. Several people were accidentally shot while performing this function so a crank lock was installed, so that the gun could not be fired.

The center shaft was fitted with a leather sleeve between the front and rear barrel supporting plates. The purpose of this sleeve was to cut down on the amount of heat that could be radiated to the shaft from the barrels after sustained fire. This was very important because as the shaft got hot it would expand, changing the headspace.

An improved feed hopper was designed to accept a new type of magazine. The hopper mouth was now located to the left of center and held the magazine in a vertical position. Because of this, the sights were moved to the right side of the frame. The models prior to the 1874 had the magazines held at a 45 degree angle so as to not interfere with the sights, with the exception of guns with the Brodwell drum.

The magazine had a trapezoid shaped cross-section. It was a thin plated box with brass end that held 40 rounds. As on previous models, the magazine had a heavy brass follower and a spring catch to keep cartridges in, but this catch disengaged automatically when the magazine was inserted.

The model 1874 had two barrel lengths, one was 32 inches and the other, known as the camel gun, had an 18 inch barrel length. This gun was known as the Camel Gun because you could get a mount for the gun that could be carried on a camel's back. This gun could also be supplied on a typical mount.

The model 1877 Bulldog was the first production gun

that had its barrels fully encased in a bronze housing giving the gun the appearance of a small cannon. The muzzles of the five 18 inch barrels stuck through a bronze plate that covered the front end of the gun. The crank handle was attached at the back directly to the center shaft. The Bulldog had a rate of fire of 1,000 rounds per minute. The Bulldog was chambered for .45/70 and weighed only 90 pounds.

The big change on the model 1879 was the method of traversing the gun approximately 80 degrees. This was accomplished by eliminating the oscillator and swiveling the gun on its mount. It could be locked into place by use of a friction brake. The elevation was adjusted by means of a pointing bar. This bar was attached to the yoke and ran through a binder box on the breach end of the gun. When you lifted up on the handle, the muzzle of the gun would go down. This too could be locked in any position.

The model 1879 had the headspace adjustment moved from the front of the gun to the rear where it could be adjusted with safety. Headspace was adjusted by means of turning the cascable knob clockwise or counter clockwise to increase or decrease headspace. A spring lock held the cascable knob at the desired setting.

The model 1879 Gatling Gun had ten 32 inch barrels. It was 49 inches in length overall and weighed 200 pounds less the mount.

The model 1881 was designed to use the Bruce feed system designed by L. F. Bruce. This system consisted of a bronze frame that held a strut bar with two T-shaped slots machined along its face that would accept the heads of .45/70 cartridges. This bar was attached to the frame and would swing back and forth. When one slot was emptied the bar would swing and line up the full track with the feed hopper. The major advantage of this system is that while one track was feeding the gun a person could be loading the other track giving you an uninterrupted string of fire. The model 1881 went back to having exposed barrels.

The model 1883 returned to the enclosed barrel configuration. This model also had a crank that could be attached to the side which yielded a rate of fire of 800 RPM or the rear which gave a rate of fire of 1500 RPM.

The model 1883's were also fitted with Accles feeds which was invented by James Accles. The Accles feed system was a large donut shaped magazine that mounted on the Gatling Gun standing up. Inside the drum was a wheel with slots machined in it that was turned by the guns internal mechanism. The slots were loaded with cartridges that followed a spiral track around to the gun. The Accles drum was way ahead of its time but proved to be too fragile and jammed easily.

The most important improvement of the 1883 was the cocking switch. The cocking switch had two different

settings, one would let the gun function normally. The other setting would not let the firing pins cock and fire. The biggest advantage this had is that the guns could be cleared of ammunition without firing it. It could also be used as a safety.

The model 1889 returned to the exposed barrel configuration and the Bruce feed system. The model 1889 also incorporated an improved cocking switch, a nearly all metal carriage and armored shields to protect the gunner.

The model 1893 was a strengthened model 1889 to handle the U. S. Army's new .30/40 Krag cartridge. The cam way in the outer housing was also modified to provide faster actuation of the bolts.

The model 1893 also used a new step-feed system. This system consisted of a stamped sheet metal strip that had fingers on it that would hold the cartridges. The tray could only be loaded one way on the left side of the gun. As the crank was turned, the cartridges would be stripped off and the empty tray would be ejected out the right side. The strips on this feed would often jam so it was discontinued.

The model 1895 only had some minor changes that differentiate it from the 1893. The 1895 took advantage of a new bronze alloy to reduce wear. It also went back to the Bruce feed system. All parts on the 1895 were either painted olive drab or blued. The armor plate was also

redesigned to take care of some interference problems.

The only difference of the model 1900 was that improved manufacturing technology allowed the gun to be held to tighter tolerances so the bolts were now interchangeable.

The model 1903 was the same as the 1900, except that it was originally chambered for the 30-03, then rechambered for the 30-06.

In 1911 the U. S. Military declared the Gatling Gun obsolete until it was revived in the 1950s. The Gatling Gun is the basis for a number of the US militaries most advanced weapons systems including the Vulcan, the Mini-Gun, and the Phalanx System. Proving that Dr. Gatlings system was way ahead of its time.

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