America's Procurement Problems: U.S. Army Small Arms 1865-1918

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Abstract

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From the late 1860s to 1918, the U.S. Army Ordnance Department experienced a rapid transformation of small arms technology that impacted the adoption and production of new weapons. The shift in small arms technology revolutionized the type of small arms within the U.S. Army. Still, it exposed problems faced by the Ordnance Department regarding the quantity and quality of firearms. The small arms of the U.S. Army incorporated many new technologies that increased an individual's firepower in the field and changed the conflicts involving the U.S. Although incorporating some of the most advanced technologies, the U.S. Army consistently was underequipped for the wars that it participated in during this time. This thesis argues that through this rapid transformation of small arms, the U.S. Army Ordnance Department adopted some of the most advanced technologies but inadequately produced the necessary number of small arms for the U.S. Army, impacting the wars in which the U.S. fought. Through combat, especially in the Spanish-American War and First World War, the Ordnance Department expanded its adoption of new technologies and accusations of small arms.

Dedication

In dedication to my friends and family for their support.

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Introduction

The First World War is often characterized as having a slew of new technologies—tanks, airplanes, chemical agents, and, most commonly, machine guns. But before the First World War, there was also a rapid advancement of technology in small arms that transformed the future of firearms. Black powder muskets had been the predominant weapon for close to four centuries; there were minor changes to the ignition system, but those changes often took decades.[1] In the last few decades of the nineteenth century, there was a rapid change in firearm design, from black powder muzzleloading rifles to self-loading rifles and machine guns. Not all nations adopted the new technologies simultaneously, especially with the United States. The U.S. Army, until the early 1890s, was still primarily equipped with Civil War-era small arms, but through the Spanish-American War and later the First World War, the U.S. Army and Ordnance Department realized the need to modernize their small arms quickly.

This thesis borrows a term from a recent work by Paul Lockhart, *Firepower: How Weapons Shaped Warfare*. In his work, Lockhart characterizes the period between 1870 and 1918 as the "Revolution in Firepower," in which this rapid change in weapons technology occurred.[2] This revolution encompassed more technologies than just small arms; navies of the world evolved from wooden frigates to ironclads and armored battleships, and the armies developed new ways in which soldiers could increase their firepower, with machine guns and quick-firing artillery as prime examples. The "Revolution in Firepower" occurred at a different pace around the world. The United

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1 Kenneth Chase, *Firearms: A Global History to 1700* (Cambridge: Cambridge University Press, 2003), 1.

2 Paul Lockhart, *Firepower: How Weapons Shaped Warfare* (New York: Basic Books, 2021), 235.

States was one of the slowest to adopt the new technologies in the late nineteenth century. Although Lockhart mentions the American adoption or non-adoption of some new technologies, he covers more of the global and extensive history of these new technologies. This thesis explains in greater detail how the Ordnance Department and the U.S. Army handled the "Revolution in Firepower."

Compared to other industrialized nations of the late nineteenth century, the U.S. was much more reluctant to adopt new small arms technologies. Still, Americans were aware of many of these advancements. This raises the question, how the Ordnance Department responded to the rapid technological changes during the "Revolution in Firepower," and what they were looking for in the next generation of a standard service weapon? In addition, during this revolution, the United States went to war with Spain in the Spanish-American War and the Central Powers in the First World War. These wars drastically affected U.S. procurement. Even though the U.S. was one of the most industrialized nations, it still found itself behind when entering each conflict.[3] What lessons were learned from combat during these conflicts, and how did they dictate the future adoption of small arms for the U.S. Army? The U.S. Ordnance Department had tested most of the newest technologies but was slow to adopt many of them. It took the lessons drawn from combat for Ordnance and the U.S. Army to adopt the new rifle and machine gun technologies of the "Revolution in Firepower."

At the start of the 1880s, the Ordnance Department began trials of new rifle technologies, including repeating mechanisms and cartridge magazines. It took until 1892 for the Ordnance Department to approve the adoption of these technologies coalescing in

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[3] Paul A.C. Koistinen, *Mobilizing for Modern War: The Political Economy of American Warfare, 1865-1919* (Lawrence: University Press of Kansas, 1997), 2.

the U.S. Magazine Rifle Model 1892. In addition to experimenting with rifles, the first machine guns were invented by individuals such as Hiram Maxim and John Moses Browning and then tested by the U.S. Ordnance Department, although the U.S. Army adopted none. When the Spanish-American War broke out, the army experienced a severe procurement problem as there was a severe lack of equipment and insufficient mechanisms to acquire all sorts of guns and other items for a rapidly growing force of over 270,000 officers and men.[4] After the war, the Ordnance Department realized that Krag-Jorgenson rifles had become outdated and needed replacement, so they turned to the Spanish Mauser and, through further development, created the Model of 1903 Springfield. The war also saw a limited but essential use of machine guns during the campaigns in Cuba. Although there had been many vocal lower-ranking officers, like Lt. John Parker, who can be considered part of the reform-minded military that historian James Abrahamson covers in his work, the more extensive adoption of machine guns had to wait until U.S. entry into the First World War.[5] A similar problem of scale recurred during the First World War, where the American Expeditionary Force (AEF) lacked enough rifles for the surge of nearly four million men. To equip the AEF, Ordnance had to borrow foreign-designed rifles and machine guns from the Entente powers, primarily relying on France and Great Britain. During the "Revolution in Firepower," the Ordnance Department had a procurement quantity problem due to the inability to upscale production rapidly rather than a quality problem. The material the army had was adequate, but it was never available in large enough numbers.

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4 Albert A. Nofi, *The Spanish-American War, 1898* (Cambridge: De Capo Press, 1997), 63.

5 James L. Abrahamson, *America Arms for a New Century: The Making of a Great Military Power* (New York: The Free Press, 1981), XIV.

Some literature has emerged in recent decades on the transformation of technology during this period in the U.S., but most focus on the transformation of the United States Navy. In her work, *Torpedo: Inventing the Military-Industrial Complex in the United States and Great Britain*, Katherine Epstein looks at torpedoes as a form of command technology, a term borrowed from historian William McNeill.[6] Command technology is the combined effort of the government and the private sector to create new technologies that are designed for specific needs. State agents have a variety of demands on their equipment, and with command technology, the state becomes invested in the research and development of new technologies as well. More considerable technological feats, such as torpedoes and battleships, often get covered in the study of command technology. Still, the idea of command technology can also apply to the development of new small arms. During World War One, the British and later the American government invested in developing the P14 in American companies, which both nations used during the war. Throughout this thesis, the narrative depicts a constant relationship between the government and the private sector, as the private sector tended to produce new technologies to specifications set by leaders of the armed forces and manufacturers in close cooperation, and the government had the funds for research and development as well as the need for the new arms. Small arms are often mentioned in historical literature as a constant development theme in military history.[7] In the late nineteenth century, the rapid transformation of small arms technology provided an avenue for exploring the relationships between the U.S. government and private industry.

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6 Kathrine C. Epstein, *Torpedo: Inventing the Military-Industrial Complex in the United States and Great Britain* (Cambridge: Harvard University Press, 2014), 74.

7 Max Boot, *War Made New: Technology, Warfare, and the Course of the History, 1500 to Today* (New York: Gotham Books, 2006), 103.

This thesis utilizes *The Reports of the Chief of Ordnance* as a base for assessing the testing and adoption of new materials. The testing regulations and requirements allow for analysis of what technologies the U.S. Ordnance and Army looked at throughout the "Revolution in Firepower." Specific sets of trials, especially the 1881 and 1891 trials, show that within ten years, the U.S. had fallen behind other industrialized nations and illustrate the pressure of adopting a modern service rifle. Other sources used in this thesis include soldiers' memoirs, including prominent figures such as Theodore Roosevelt (1898) and Alvin York (1918). These memoirs help show the relationship between the American soldier and their rifle, whether well-liked or hated. The thesis is also technical in its approach to testing reports and the service modifications that came with adopting the new small arms. More technical information comes from other sources, such as field manuals or studies on rifles or machine guns. All these sources combined detail the evolution of small arms technology and the procurement system of the army's Ordnance Department.

This thesis is divided into three chapters, each covering a segment of the "Revolution in Firepower." The first chapter examines the early part of the revolution and the new technologies developed in the 1880s and 1890s. The adoption and development of the Krag-Jorgenson resulted from the Ordnance Department's requirements for the new service rifle. In addition to the development of rifles, the first machine guns were developed. Still, the Ordnance Department was more cautious about adopting this firepower increase and technical complexity. Chapter Two covers the Spanish-American War and how the lessons from combat impacted the procurement of future small arms within the U.S. Army. With insufficient rifles in storage and the Spanish rifles performing

better than the Krag, the U.S. Army looked to equip the entire service with its version of the Mauser rifle. In addition, the Spanish-American War was the first time in which machine guns were deployed, and it sparked conversations within Ordnance on how to use the newly procured machine guns better. The final chapter details the culmination of the "Revolution in Firepower" in the U.S. Army during the First World War. Like the Spanish-American War, the U.S. Army had significant procurement problems but instead had to rely upon its allies to fulfill its demands. The start of the revolution saw the U.S. as having one of the least advanced small arms among industrialized nations. Still, at the culmination of the rapid advancement of technology, the United States had some of the most advanced small arms at the time.

Different technologies have seen different rates of evolution. In the late nineteenth century, small arms had so rapidly developed that it became difficult to ascertain the best technologies and others that were novelties. The U.S. Army was also equipped with a nearly three decades old rifle, leaving it to deal with obsolescent rifles into the twentieth century. The "Revolution in Firepower" transformed the service weapons of the U.S. armed forces. Still, it was not without tribulations, as the U.S. Ordnance had to procure the weapon systems they believed were the best designs during this period. The rifles that Ordnance approved for adoption were often of the same quality as those of other industrialized nations. Still, there were significant problems with procuring enough of them for the wars the U.S. joined. The main problem had to do with the unexpected rapid growth in the number of soldiers in 1898 and again in 1917 and 1918, which plagued the adoption of rifles and the professionalization of the army.[8] The revolution occurred when

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[8] Brian McAllister Linn, *The Echo of Battle: The Army's Way of War* (Cambridge, Harvard University Press, 2007), 41.

the U.S. was at peace and war, but as technology progressed, so did the army's weapons, which may have been slower than other nations. However, by the end of the First World War, the U.S. was a leader in some small arms developments.

Chapter One: Initial Testing and Adoption of New Small Arms in the United States

Rifle Development Post-American Civil War

In 1865, the United States concluded its four-year Civil War. After years of conscription, the U.S. Army had swelled in size and material.[1] The American arms sector had to produce millions of arms and equipment to equip this army. Springfield Armory had to produce thousands of rifles daily and test the American manufacturing system. That system, as described by historian David Hounshell, was an attempt to create interchangeable parts utilizing specialized machinery at a mass production scale.[2] This was not easily accomplished in the republic's early days, but with the advent of the American Civil War, mass production of arms became incredibly important. The American system set up by John Hall in the early 1800s would be taken by manufacturers and expanded from what the Springfield Armory had tried to achieve.[3] The idea of interchangeable parts became a hallmark of arms design and would later be an issue for new service rifles. In the immediate aftermath of the Civil War, the U.S. faced multiple problems in the armed service; one of the biggest was the multiple service weapons in its arsenals and the significant budgetary cuts that came with the reduction of the military.

Following the end of the American Civil War, the Union was left with large stockpiles of firearms, be it from their own inventory or the arms of the Confederacy. Due to the chaos of the Civil War, there were many different models and calibers in service. The Springfield Model 1861 was the primary arm of the Union, but different

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1 Susan Canedy, Recruitment. *The Oxford Companion to American Military History,* ed. John Whiteclay Chambers II (Oxford, Oxford University Press, 1999), 595.

2 David A. Hounshell, *From the American System to Mass Production 1800-1932: The Development of Manufacturing Technology in the United States* (Baltimore: The Johns Hopkins University Press, 1984), 3.

3 Hounshell, *From the American System to Mass Production 1800-1932*. 43.

arms, such as the Colt Special Model 1861, were also in service during the war. In addition to the standard rifles, carbines and handguns were issued to specialty troops like cavalry and artillerymen. With the Civil War over, the American military no longer needed large numbers of rifles, and the U.S. government turned to surplussing much of the wartime arsenal.[4]

The Civil War spawned incredibly high production of many war supplies, but maintaining many of these weapons was expensive after the war. To store many firearms like the 1861 Springfield, they had to be repaired, prepared for storage, and constantly maintained to prevent deterioration in case another war was to start. Post-Civil War, there was a significant cutback on military spending, and the defense budget dropped significantly from over eleven percent of GDP in 1865 to a low of .9 percent of GDP in the following decade.[5] In addition, in the wake of the Civil War, the U.S. government was in massive debt due to military expenditures.[6] To secure more funds, the U.S. decided to sell arms in the international market to reduce the cost of maintaining weapons. During the Franco-Prussian War, some American surplus went to Europe, as it was cheap and available, while some French arsenals were being overrun. During the early parts of the war, the U.S. Ordnance Department auctioned off "war surplus," which spawned a private arms trade, with the main buyer being France.[7] Besides being used in other wars, the domestic American market was flooded with Civil War arms. Large companies like

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4 Spencer Tucker, *Almanac of American Military History* (New York, Bloomsbury Publishing Inc., 2012), 1028.

5 "Big War Spikes," US Government Spending, accessed October 30, 2023, https://www.usgovernmentspending.com/defense_spending_history

6 Max M. Edling, *A Hercules in the Cradle: War, Money, and the American State, 1783-1867* (Chicago, The University Chicago Press, 2014), 106.

7 Benjamin Franklin Cooling, *Arming America Through the Centuries: War, Business and Building a National Security State* (Knoxville: The University of Tennessee Press, 2022), 90.

Shuyler Hartley & Graham supplied weapons to the domestic market and later turned to the international market because of the vast surplus.[8] What the U.S. Ordnance Department did not surplus, they kept in long-term storage, and with technology progressing to black powder, breach-loading firearms, the U.S. was slowly falling behind in the global small arms race.

The 1861 Springfield was a muzzle-loading, black powder rifle that was one of the primary weapons in the army arsenal at the time. Only a few years following the adoption of the 1861 Springfield, the Dreyse, the first practical breech-loading rifle, was adopted into the Prussian Army and used in the Austro-Prussian War.[9] Adopting a breech-loading mechanism on a service weapon was the next evolution in firearms technology and is attributed to being a factor in the Prussian victory over the Austrians.[10] The breech-loading mechanism allowed for faster reloading of the firearm compared to muzzleloading contemporaries, and importantly, it allowed for the shooter to reload from the prone position.[11] As a cost-saving measure, the U.S. Ordnance Department decided that converting old Springfield rifles to breechloaders would be cheaper than purchasing a new rifle.

In 1865, Erskine S. Allin, the Master Armorer at Springfield Armory, designed his conversion of the 1861 Springfield. The major benefit of having the rifles converted was that it used some of the old parts like the barrel and parts of the hammer assembly. The

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8 "Schuyler, Hartley, & Graham: The Original Gun Dealer," Buffalo Bill Center of the West, Danny Michael, accessed October 4th, 2023, https://centerofthewest.org/2016/12/09/schuyler-hartley-graham-original-gun-dealer/

9 Martin Van Creveld, *Technology and War: From 2000 B.C. to the Present* (New York: The Free Press, 1989), 220.

10 Max Boot, *War Made New: Technology, Warfare, and the Course of the History, 1500 to Today* (New York: Gotham Books, 2006), 130.

11 William H. McNeill, *The Pursuit of Power: Technology, Armed Force, and Society since A.D. 1000* (Chicago, The University of Chicago Press, 1982), 252.

conversion only required the addition of a new breech block, shell extractor, and breech screw.[12] The idea of a breech-loading mechanism was not new. One of the first was designed by John Hall at Springfield Armory in the early 1800s, which was similar to some of the other designs of the time, like the British Snyder and Prussian Dreyse.[13] The Allin Conversion would later lead to the official adoption of the "Trapdoor" Springfield in 1873, which was the primary service rifle of the American Army until the 1890s. The name "Trapdoor" comes from the mechanism of the rifle acting on a hinge to lock the breach. Although the Trapdoor was considered a practical option, technology progressed. By the mid-1880s, cartridge magazines, smokeless powder, and bullet technologies had evolved and became more important for contemporary arms. The transition from single shot to repeating rifles had started to become more prominent throughout the world.

Adopting a cartridge magazine was the first technology to be looked at by the U.S. Ordnance Department in the 1880s. The cartridge magazine allowed for the rapid reloading of a firearm and, in most rifles, allowed ammunition to be held in reserve for emergencies. In July 1881, the U.S. Ordnance created the Magazine Board, which was responsible for testing new cartridge magazines developed domestically along with some international designs.[14] In fifteen months, over forty rifles with new magazines were submitted in hopes of a U.S. military contract. Some notable entries were from Benjamin B. Hotchkiss, Remington Arms Company, James Paris Lee, Marlin Firearms Company,

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[12] John Langellier, *The "Trapdoor" Springfield: From the Little Bighorn to San Juan Hill* (New York: Osprey Publishing, 2018), 8.

[13] David A. Hounshell. *From the American System to Mass Production 1800-1932,* 39.

[14] Stephen V. Benet, *Report of the Chief of Ordnance to the Secretary of War for the Year 1882* (Washington: Government Printing Office, 1882), 5.

and Chaffee-Reece.[15] Springfield Armory had updated its manufacturing and testing facilities during this time to accommodate these new rifles.[16] For these tests, Springfield Armory saw this as an opportunity for their own engineers to develop the service rifle and adapt the Trapdoor, saving money on the conversion of machinery, so they submitted their own conversions of the trapdoor. There were multiple designs of how the magazine mechanism works; some were forward of the action in a tube, commonly referred to as a tubular magazine that went to the end of the barrel. Another design has a tubular magazine in the shoulder stock of the rifle, which was similar to the Spencer Carbine used in the American Civil War. A more radical design came from James Paris Lee, a detachable box magazine, the progenitor of modern-day detachable magazines. The Magazine Board assessed all these types of magazines in some very in-depth stress tests.

In 1882, stress tests were performed for several models. They included an endurance test, firing five hundred rounds consecutively, and handling in rough conditions. Dust and rust were two concerns that the magazine board was testing for, especially with the operation of the cartridge magazine. For the dust test, the rifles were subjected to a blast of sand dust for two minutes, then had to fire twenty rounds, then repeat.[17] The rust test was a more extreme test where the rifles had all grease removed, dipped into salamoniac for ten minutes, and left on a rack for two days; after that, the rifle needed to fire twenty rounds.[18] A more critical test during the 1882 trials, besides the operation of the rifle's action, was the magazine. Under supplementary tests, there was a

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15 John Pitman, *The Pitman Notes on U.S. Martial Small Arms and Ammunition 1776-1933: Volume Three U.S. Breech-loading Rifles and Carbines, Cal. .45 (Gettysburg, PA: Thomas Publications, 1991), 163.*

16 Stephen V. Benet, *Report of the Chief of Ordnance to the Secretary of War for the Year 1879* (Washington: Government Printing Office, 1879, 191.

17 Benet, *Report of the Chief of Ordnance for 1882*, 335.

18 Benet, *Report of the Chief of Ordnance for 1882*, 335.

concern that certain tubular magazines would be liable to an accidental explosion, causing all cartridges to blow up.[19] This would occur when a cartridge's tip hit another's primer with enough force to ignite it. That happened with the Marlin Magazine Gun, No. 16 which was removed from the test. No one was injured.[20] The test had some notable conclusions and clear favorites for what could have been a new service rifle in 1882.

The Remington-Keene No. 2 was successful throughout the first trials. It had some minor issues, like extractors failing to extract a fired casing, but it opened easily on the rust tests and fired the five hundred rounds with only two misfires.[21] Hotchkiss No. 5 also went through the first round of trials without too many failures and even moved on to the third round.[22] The Lee gun No. 10 showed no problems during the initial testing and was reportedly well-liked by the magazine board. It was a favorite during all of the testing.[23] The second and third rounds of tests were largely repeats of the first tests, but by the time these were complete, the Lee, Hotchkiss, and Chaffee-Rece were clear winners.

Similar to converting the old Springfield Model 1861, the Magazine Board also tested some conversions of the Trapdoor Springfield. Converting the existing Trapdoor Springfield was considered an additional cost-saving measure and would support innovation within the U.S. Ordnance Department. The Springfield-Jones Rifles modified a few parts of the original Trapdoor, but it added a tubular magazine fitted in the rifle's stock. The Trapdoor had already been used throughout the Indian wars, and the addition

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19 Benet, *Report of the Chief of Ordnance for 1882*, 336.
20 Benet, *Report of the Chief of Ordnance for 1882*, 400.
21 Benet, *Report of the Chief of Ordnance for 1882*, 379.
22 Benet, *Report of the Chief of Ordnance for 1882*, 384.
23 Benet, *Report of the Chief of Ordnance for 1882*, 392.

of a magazine would put it roughly on par with some of the civilian rifles on the domestic market. The rifle had multiple failures during the test, but at first, it could be repaired by the inventor. Later on, during the endurance test, the gun had to be withdrawn because of failures, including the stock splitting, and as a single-loading rifle, the gun failed to eject many cartridges.[24] The final designs ended up winning due to their rigidity under stress and the reliability of the magazine system in the first rounds of testing. Three designs passed the initial tests, and moved on to troop trials, the Lee, Chaffee-Reece, and Hotchkiss.

The Chief of Ordnance recommended that fifty thousand dollars be allocated to the manufacturing and purchase of the rifles, which Secretary of War Robert T. Lincoln approved the next day.[25] The troop trials would last until 1886, with the overall recommendation that no new firearms be accepted into service after extensive testing. In a letter from Benet to the Secretary of War, none of the magazine guns should be adopted or substituted for the current Trapdoor Springfield.[26] Benet went as far as to say, "The Springfield rifle (Trapdoor Springfield) gives much general satisfaction to the Army that we can safely wait a reasonable time for further developments of magazine systems."[27] Some of the main complaints from the troop trials included an extremely heavy trigger pull and complications due to black powder fouling. The biggest concern was that the new magazine rifles were difficult to operate with reloaded ammunition, which was still necessary for an army on the frontier. Although a major complaint for the advent of

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[24] Benet, *Report of the Chief of Ordnance for 1882*, 436.
[25] Benet, *Report of the Chief of Ordnance for 1882*, 331.
[26] Stephen. V. Benet, *Report of the Chief of Ordnance to the Secretary of War for the Year 1886* (Washington: Government Printing Office, 1886), 4.
[27] Brigadier-General Stephen V. Benet to Secretary of War William C. Endicott, 15 December 1885, in *Report of the Chief of Ordnance 1886*, 5.

machine guns, the complaint of ammo shortages also applies to the usage of ammunition in the American frontier. This is still in an era where cartridges were easier to come by with separate components on outer forts.[28] The complaint about the overconsumption of ammunition also coincided with more conservative members of the U.S. Army and their reluctance to adopt new technologies.

Borrowing some terms from Brian McAllister Linn, these more conservative generals or army personnel would be the "guardians" of the old service rifles. These guardians were primarily interested in a potential naval threat on the Atlantic coast; therefore, they heavily invested in coastal defenses and harbor fortifications instead of equipping the army with the most technologically advanced rifle.[29] This translated into the 1880s, when these magazine rifles were tested. General Sheridan told Congress in 1884 that because war with another foreign power seemed so remote, there was no need to adopt a new magazine rifle.[30] Like many other guardians, Sheridan espoused the notion of ammunition conservation while on a campaign, amongst other complaints. Opposing the guardians, the personnel who looked to change and innovation to end wars, in this case, could be considered "heroes."[31] In the case of the weapons trials, these heroes saw the progression of technology as the key to winning future conflicts. Ultimately, the guardians had a stronger argument not to adopt a newer rifle and instead looked at the experiences on the Great Plains to discount the need for a more

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[28] David A. Armstrong, *Bullets and Bureaucrats: The Machine Gun and the United States Army, 1861-1916* (Westport, CT: Greenwood Press, 1982), 137.
[29] Brian McAllister Linn, *The Echo of Battle: The Army's Way of War* (Cambridge, Harvard University Press, 2007), 5.
[30] Linn, *The Echo of Battle,* 61.
[31] Linn, *The Echo of Battle,* 6.

technologically advanced rifle. The Trapdoor Springfield had proven its utility during years of conflict in the American West during this time.[32]

The Trapdoor Springfield had become synonymous with the Army in the West. The rifle had proven itself over decades of war, and the logistics of servicing it and ammunition were already in place. These were all the benefits that were stressed to discourage the thought of adopting a new rifle. The ruggedness of the Springfield showed in the 1882 troop trials of the potentially new service rifles. The new rifles had been sent to many army posts, including ones in the Great Plains. Test results listed what magazine rifles were preferred and which performed best, stacking the new magazine rifles against the Trapdoor. The conclusion clearly showed that the Lee rifle was preferred out of all the new magazine rifles, but when comparing all the rifles, including the service rifle, a majority of the infantry regiments responsible for testing preferred the Trapdoor Springfield.[33] Even specific outfits like Company K of the 21st Infantry Regiment stated that they were entirely opposed to a magazine gun.[34]

On actual deployment in the Indian Wars, the Trapdoor proved quite effective on the plains. But as technology progressed, the Trapdoor-style rifle only stayed in service for a decade. The most famous use of the Trapdoor came during the Battle of Little Big Horn. One of the biggest problems reported from the Indian Wars was the ammunition getting stuck in the chamber; there were several reasons for this, but the most frequent problem was the black powder fouling after firing. Reportedly, archaeological excavations showed that almost four percent of cases recovered from the battle had signs

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32 Langellier, *The "Trapdoor" Springfield,* 34.
33 Benet, *Report of the Chief of Ordnance for 1886, 526.*
34 Benet, *Report of the Chief of Ordnance for 1886, 516.*

of failed extraction, and after, the U.S. Army modified the cartridge for better extraction.[35] This was one sign that the trapdoor was antiquated; another was the fact that the warriors that the U.S. Army was fighting often had more technologically advanced civilian rifles. A guide of Lieutenant Colonel Custer reported that Sitting Bull was amassing weapons that included Winchester repeating rifles.[36] Although the Winchester was not the only weapon used by the Natives, it was a magazine-repeating rifle that allowed for a greater volume of fire than the Trapdoor Springfield. Magazine Repeaters were used to a significant effect at The Battle of Little Big Horn and demonstrated to the U.S. Army that it needed to adopt a new rifle. This need led to the 1882 magazine rifle trials.[37]

The different magazine systems were not the only new technology being debated for adoption; a new service cartridge utilizing smokeless powder was being considered. Before the advent of smokeless powder, firearms operated with black powder, which had multiple problems when dealing with repeating rifles. In 1884, a French chemist, Paul Vielle, created nitrocellulose that he called "Poudre B" or powder B.[38] This clean burning powder produced little smoke when the bullet left the barrel, producing less fouling. This invention brought multiple benefits for small arms technology and changed how firearms were designed from that point forward. One of the leading detractors of small arms up until the invention of smokeless powder was that substantial amounts of smoke were produced once fired, creating a huge signature. On a tactical level, this gave away a

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35 Richard A. Fox, *Archeology, History and Custer's Last Battle* (Norman, OK: The University of Oklahoma Press, 1993), 241-242.

36 James Donovan, *A Terrible Glory: Custer and the Little Bighorn - The Last Great Battle of the American West* (New York: Little, Brown and Co., 2008), 118.

37 Thom Hatch, *Custer and the Little Bighorn* (London, McFarland & Company Inc., 1997), 184.

38 Yoel Bergman, "Paul Vielle, Cordite & Ballistite*," Icon: International Committee for the History of Technology* 15 (2009): 1. 3

shooter's position and formed large clouds blocking the shooter's vision when he fired. In addition to a smaller smoke signature, smokeless powder produced less fouling in the firearm.

Smokeless powder burned cleaner, which allowed more rounds to be fired without the need for cleaning. Fouling had been a significant problem in designing repeating rifles, as the fouling after continuous firing caused actions to seize and become inoperable. Specific cuts in early breach loading mechanisms were designed to allow shooters to fire more rounds before they had to clean the firearm, but this did not stop the fouling from being a problem.[39] With the introduction of brass cartridges, some of these issues were negated but were still an issue in early breach loading rifles. Smokeless powder burned cleaner and left less fouling, making repeating actions functional for military arms. The first nation to adopt a smokeless cartridge was France in 1886, with the creation of the Lebel rifle and the 8mm Lebel cartridge, which Lockhart notes had become a new standard compared to the older .40 and .45 cartridges.[40] The U.S. was not far behind in creating or evaluating its version of smokeless powder, and it hoped to match it with a new rifle design as well.

The first tests of smokeless powder conducted by the U.S. Ordnance were recorded in 1888, two years after the French adopted their smokeless powder rifle. In addition to the desire for smokeless powder, there was a shift in global armies to adopt a smaller caliber of bullet. When fighting on the plains, where ammunition was limited due to resupply, lighter ammunition allowed an individual or pack horse to carry more rounds

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[39] Vivian B. Lewes, "Explosives and Their Modern Development," *The Journal of Society of Arts*, 43, No. 2199 (January 11, 1895): 136.

[40] Paul Lockhart, *Firepower: How Weapons Shaped Warfare* (New York: Basic Books, 2021), 272.

on a campaign. The Ordnance Department was looking at acquiring a new standard issue cartridge that was smaller in diameter and could use a new powder formulation as a propellant. Procuring a new smokeless powder was proving to be more difficult as the ignition of the powder created too much pressure, which could damage the rifle, lead to a shorter service life, and possibly injure the shooter.[41] While the testing of smokeless powder did not go well in 1888, the invention's potential stuck with American Ordnance officials.

Testing would continue for some time as the correct formulation had to be experimented with, but the Ordnance Department understood the importance of the new propellant, looking at other countries like France. Specifically mentioned in the *Report of the Chief of Ordnance,* "The result obtained in France with the Lebel rifle seem to point to a radical innovation in the manufacture of powder for small arms."[42] The testing of smokeless powder lasted for another four years and wouldn't be completed until a new adoption of both cartridges and a rifle. By 1890, the U.S. was critically aware of the new technologies that other nations were adopting. The U.S. Ordnance Department understood that a cartridge magazine allowed for increased firepower by individual soldiers. The problem of creating the correct composition of smokeless powder had delayed the measure, but the advantages of a smokeless round were undeniable. Both technologies would be combined in 1892 when the U.S. adopted a new service rifle, the U.S. Magazine Rifle Model 1892 (also known as the Krag-Jorgenson Rifle).

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41 Stephen. V. Benet, *Report of the Chief of Ordnance to the Secretary of War for the Year 1888* (Washington: Government Printing Office, 1888), 11.

42 Benet, *Report of the Chief of Ordnance Year 1888*, 11.

Before the U.S. had adopted a new service rifle that would include a magazine and a smaller smokeless caliber round, the U.S. had been falling behind in adopting those technologies. The French were the first to adopt the combination with the 1886 Lebel rifle. Imperial Germany was not far behind and formed a commission that developed the Mauser Model 1888, more commonly known as the "commission rifle."[43] The British had also developed the Lee-Metford from the design of James Paris Lee, who was in the original 1882 magazine trials. Other continental powers had been adopting rifles of these designs simultaneously. The U.S. was still stuck with a single-loading black powder rifle as these modern repeaters were being adopted. This did not mean that the U.S. was not interested in a new rifle with the most up-to-date technologies; the U.S. Ordnance Department wanted a rifle that fully fit their needs, similar to other nations. The cost was not a major concern as Congress was funding the regular army and state militias through the 1890s and designated older arms to go to militias and the newly produced rifles to the regular army. This additional funding continued, especially as the U.S. went to war with Spain and the demand for rifles increased.[44]

The U.S. Ordnance Department decided to take advantage of similar commissions from abroad and compared the foreign rifles to the ones submitted to the 1891 rifle tests.[45] From the outset of these tests, the board was looking to adopt a domestically designed rifle, but this would not come to fruition. It had already been decided that the new rifle would take a .30 caliber ammunition, already a standard caliber adopted by

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43 Will Fowler and Patrick Sweeney, *The World Encyclopedia of Rifles and Machine Guns: An Illustrated Guide to 500 Firearms* (East Bridgewater, MA: JG Press., 2012), 137.

44 Daniel W. Flagler, *Report of the Chief of Ordnance to the Secretary of War for the Year 1897* (Washington: Government Printing Office, 1897), 4.

45 Stephen. V. Benet, *Report of the Chief of Ordnance to the Secretary of War for the Year 1891*(Washington: Government Printing Office, 1891), 33.

other military worldwide.[46] Within the submission of new rifles, two distinctions are important to consider. The first can be charged with quick-loading devices, most commonly stripper clips or chargers. Examples of this include the German Mausers and the Austrian Mannlicher. The secondary distinction is the magazine cutoffs, where a magazine can be held in a reserve. Holding a magazine in reserve serves more for doctrinal and training purposes but is planned for use in emergencies, such as overrun positions or naval landings. All systems would be evaluated in 1891 with a wide range of submissions.

In total, there were fifty-three submissions to the 1891 trials. It included multiple examples from other countries already adopting a smokeless magazine repeater. Some great powers of the time submitted weapons, like France, Germany, Austria, England, and Russia. However, smaller nations like Portugal, Switzerland, and Denmark also had their rifles exhibited, showing how far the U.S. was behind compared to even minor powers in Europe when it came to small arms development.[47] The trial also included domestic designs from American manufacturers like Lee Arms Company, Chaffee-Reece Arms Company, and Springfield Armory. The testing of the rifles was similar to the 1882 test series. Guns would be tested on resistance to mud, corrosion, dust, and multiple firings. The No. 28 Krag Jorgenson No. 5 won the competition in the end.

The Danish-made Krag Jorgenson was a bolt action repeater fed by a magazine. The magazine was unique in that it loaded through a side gate instead of the rifleman having to open the action and place more rounds in the magazine. Throughout the tests,

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46 Lt. Col. William S. Brophy, *The Krag Rifle* (North Hollywood, CA: Beinfield Publishing Inc., 1986), 5.

47 Brophy, *The Krag Rifle,* 10.

the Krag succeeded in all of them, operating as a single loader and a repeater. When the Krag was selected as the next American service rifle, there was much backlash from members of Congress that a foreign design was adopted over a domestically designed and produced firearm, even though American rifles had competed and failed while the Krag succeeded. [48] Production could not begin until this issue had been solved, so another round of tests was ordered to quell opposition in Congress, where domestic rifles would go against the Krag Jorgenson.[49]

The Magazine Board continued to evaluate the domestic rifles in comparison to the Krag Jorgenson. They had fourteen new submissions, some from large companies like Lee and Savage. Still, most were from smaller manufacturers looking for a military contract to help build their arms-making facility. The testing was the same as before, but all the submissions failed for a combination of reasons, including hard operation of the bolt, inadequate foul mitigation, or just unsuitability for military service.[50] Even though the Magazine Board tested the American inventors' rifles, the Krag was favored throughout the test and still performed the best even compared to the domestic rifles. The reasoning behind the U.S. Ordnance Department's favoritism of the Krag rifle over domestically made rifles was partially because Springfield was ordered to tool up to produce the Krag eight months before the Magazine Board had made its final verdict.[51] So the Krag Jorgenson was the clear favorite and production started in 1892.

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48 Brophy, *The Krag Rifle,* 11.

49 J.M. Schofield to the War Department, May 26, 1893, in *The Krag Rifle* (North Hollywood, CA: Beinfield Publishing Inc., 1986, 15.

50 Elwell S. Otis to Springfield Armory, May 16, 1893, in *The Krag Rifle* (North Hollywood, CA: Beinfield Publishing Inc., 1986, 12.

51 Franklin B. Mallory and Ludwig E. Olson, *The Krag Rifle Story* (Ann Arbor, MI: Springfield Research Service, 2001), 58.

The Krag had become the first standard-issue magazine repeating rifle in the U.S. Army that would be issued to all its infantry. The Magazine Board and the Chief of Ordnance D.W. Flagger also wrote a letter of approval and asked the Secretary of War to approve the selection of the Krag-Jorgenson submission.[52] With the approval of the Secretary of War, Springfield Armory was authorized to start producing the new service weapon. The production of the Krag rifle ran into a few problems, and by 1894, Springfield Armory only produced around 2,950 new rifles.[53] One problem of the early models was the steel quality in gun barrels. This problem lasted until 1895 when it was found that the manufacturer had not met the specifications of the physical properties of the steel; it failed under testing. Fine cracks and seams developed, and out of the initial 55,000 pounds of steel first accepted, not one pound could be used.[54] To find other options, some Ordnance officials, such as Col. Alfred Mordecai, reached out to Winchester Repeating Arms Company for their exact formula of steel.[55] The problem was ultimately fixed, but the American system of manufacturing had failed. The initial runs of parts did not meet the standard of interchangeability, and the first rifles produced at Springfield Armory had to be recalled to be fitted for replacement barrels and other parts.

Over the next ten years, the Krag would go through multiple iterations and have some major replacement parts fitted. The first drastic changes to the rifle came in 1896 prompted by recommendations from troops after two years of service in the field. There were multiple small technical changes, including modifications to the extractor pin, the

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52 Brig. Gen., Chief of Ordnance D.W. Flagler to Secretary of War Stephen Benton Elkins, September 10, 1892, in *The Krag Rifle* (North Hollywood, CA: Beinfield Publishing Inc., 1986, 7.

53 Brophy, *The Krag Rifle,* 20.

54 Brophy, *The Krag Rifle*. 32.

55 Col. Alfred Mordecai to Winchester Repeating Arms Company in *The Krag Rifle Story*, 63.

inclusion of a magazine hold open, and further tension of the firing pin mainspring. The two major changes were made to the front and rear sight and stock of the Krag. The new shoulder stock of the rifle had been manufactured so that it could also hold the new cleaning rod and an oiler. The standard ramrod was omitted in the model 1896, and instead, a multipiece ramrod was placed into the rifle's stock for cleaning or extracting a spent case.[56] The front sight was thinned, and its shape made more slanted to negate glare from the sun, and the rear sight was reduced in length. The result would be the primary model used in the Army and during the Spanish-American War.

While it took the U.S. over ten years to fully adopt a magazine-fed smokeless powder rifle, army leaders were keenly aware of the benefits of such technology. They took their time adopting a new rifle that fit the U.S. Ordnance specifications for the revolutionary inventions. The initial trials had failed, but as the new technologies were refined, it became more feasible to equip the infantry with a new service rifle instead of the tried and tested Trapdoor Springfield. The Krag, of course, had its difficulties and would be evaluated after the first significant conflict, the Spanish-American War. More broadly, the change in small arms was not limited to rifles, and a new, more revolutionary weapon was being adopted: the machine gun.

The Proliferation of Machine Guns

Although the rifle was the main armament of the infantry, machine guns had been in service within and outside the U.S. since the end of the Civil War. The Gatling Gun was one of many forms of manually operated machine guns in use worldwide but was the most prolific in American service. The term “manually operated machine gun” is viewed as a gun that operates on the physical exertion of a soldier to fire a cartridge in quick

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[56] Brophy, *The Krag Rifle,* 38.

succession.[57] The main change that came from this quick-firing revolution was to use recoil as the principal operator of a mechanism and using the gasses from a fired cartridge to eject and load another cartridge in the chamber. This, too, became more viable with the invention of cleaner burning smokeless powder.[58] The U.S. assessed multiple designs right as recoil-operated machine guns became popular worldwide.

The most widely known machine gun of the time was the Maxim Gun, initially designed by Hiram Maxim in the early 1880s.[59] Maxim became famous in the 1910s as guns played a key role in the First World War. The operating mechanism of the Maxim bleeds off gas from the firing of a cartridge. The gas buildup pushes a rod connected to the operating mechanism, allowing another cartridge to be fed into battery. This is even more impressive as the first Maxim guns fired black powder cartridges, which fouled the small gas port and mechanism after firing. The failures of manually operated machine guns in the British and Italian Army in Africa helped to persuade other powers that a truly automatic machine gun would be a solution to malfunctions in battle.[60] The U.S. became interested in the Maxim Gun in 1887; the first tests started in 1888. The Ordnance Department procured their own and had Broderick Clote, a director of the Maxim Gun Company, in attendance.[61] He operated the weapon and explained the operation to the board in detail. Throughout the testing operation, the Maxim Gun garnered praise, and towards the end, the board drafted a list of advantages and disadvantages.

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57 Albert. E. Roark. "Doctor Gatling's Gun" *Journal of the Southwest* 4, No. 4 (Winter, 1962): 310.

58 Armstrong, *Bullets and Bureaucrats,* 76.

59 Will Elsbury, "The Machine Gun: Its History, Development and Use: A Resource Guide," Library of Congress, accessed November 10, 2023. https://guides.loc.gov/machine-gun-its-history-development-and-use

60 C.J. Chivers, *The Gun* (New York: Simon Schuster Inc., 2010), 88.

61 Benet, *Report of the Chief of Ordnance for 1888,* 66.

The main advantage of this radical invention was that a single person could operate it. The Gatling Gun, for example, had to have a loader and operator to feed and fire. Though it took two men to operate the weapon, the Gatling Gun was well-liked. Still, cutting the personnel to operate the weapon was a significant advantage.[62] This was made possible because the mechanism of the Maxim Gun fed through a continuous belt, allowing a single operator to control the feeding.[63] Other advantages that the ordnance board noted were that the gun was light, compact, and not complicated in construction, especially compared to other firearms of the time. In the board's view, the main disadvantages have to do with firearm safety. They recommended cocking an indicator to let the shooter or observer know that the firearm was ready to fire without pulling the trigger.[64]

The report concluded that another gun should be adapted to the service ammunition and procured for more extensive tests.[65] Another gun was procured, and further testing would be done over the next few years. Machine guns had their advocates in the U.S. Army, but their larger role in the military was still being decided. Machine guns were initially placed in the U.S. Army as pieces of artillery—further experiments by Capt. Edward B. Williston, in 1879, created organizational schemes and tested the Gatling Guns in the field. Later in the 1880s, Williston supported the idea that the machine gun could be best utilized as a form of artillery, but one separate from traditional cannon artillery.[66] In the indirect fire role, the machine gun would be used as a light

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62 Armstrong, *Bullets and Bureaucrats,* 81.
63 Benet, *Report of the Chief of Ordnance for 1888,* 70.
64 Benet, *Report of the Chief of Ordnance for 1888,* 71.
65 Benet, *Report of the Chief of Ordnance for 1888,* 71.
66 Edward B. Williston, "Machine Guns and the Supply of Small-Arm Ammunition on the Battlefield," *Journal of the Military Service Institution of the United States* 7, no. 26 (1886): 132.

artillery piece but organized by the artillery branch. As machine guns like the Maxim Gun became more prolific, other people started to look at the role of machine guns but were still undecided about where they would be most beneficial on the battlefield.

Initially, the main role of the machine gun was as a light artillery piece. The manually operated machine guns of the 1870s offered some examples of how best to use these technologies. During the Franco-Prussian War, the French utilized their newly developed Mitrailleuse and utilized it as a form of light artillery. Operating on a carriage and hand-cranked, it looked and operated like a form of artillery. The Prussians on the receiving end of this machine gun thought that the Mitrailleuse had little effect on the battlefield.[67] In other cases during the Franco-Prussian War, there were examples of the potential a machine gun would have on the front lines. Near Amanvillers, the Mitrailleuse was placed forward with the infantry and had much better results than the lobbing fire intended for.[68] Though a singular use, it was an example of how a proper machine gun could be utilized in battle. The main takeaway from the Mitrailleuse in the Franco-Prussian war was that this new technology still needed to be worked through and would still be best suited for artillery. This was the mentality the U.S. Army would take leading up to the Spanish-American War.

Before the Spanish-American War, the U.S. considered adopting recoil-operated machine guns after decades of experience with the Gatling Gun. The problem was how to use the machine gun to its full potential. By the mid-1890s, there was no combat experience with guns like the Maxim Gun. Captain Alexander Dyer of the Sixth Artillery

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[67] Rachel Chrastil, *Bismark's War: The Franco-Prussian War and the Making of Modern Europe* (New York: Basic Books, 2023), 93.

[68] Chrastil, *Bismark's War, 158*.

wrote one of the first handbooks on potentially using such an innovative technology. He was among the first in the U.S. Army to consider that the machine gun was not a form of light artillery; once adequately researched and evaluated, it would prove very important.[69] Further development of machine gun technology would mostly come through the civilian sector, and one of the most famous American designers, John Moses Browning, created his own in 1895.

Browning is one of American history's most important firearms designers. Known for a range of successful civilian firearms, he designed rifles, shotguns, and pistols. In 1890, he decided to try to invent a machine gun. In 1892, he was granted a patent on his first design, which was more of a proof of concept than a practical design. The breakthrough came in 1895 with the Model 1895 Automatic Machine Gun. The gun was nicknamed the "Potato Digger" as the gas piston of the firearm swung downwards. It would strike the ground with heavy motion if placed too low.[70] The U.S. Army and Navy were interested in the Potato Digger, and the Colt Arms Company was licensed to produce Browning's design. Colt produced some models with both the Krag Jorgenson cartridge and the 6mm Lee used by the Navy. The Navy took more interest in the gun; Ordnance testing of the Colt Machine Gun started in 1895 and concluded that the Colt Automatic Gun had "no place in the land armament."[71] At the same time, the U.S. was not procuring the Colt or Maxim for the U.S. Army; they were continuing to place orders for additional Gatling Guns. Although the U.S. was not ordering the most technologically

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69 Alexander B. Dyer, *Handbook for Light Artillery* (New York: John Wiley & Sons, 1900), IV.

70 Val A. Browning. *John M. Browning Armory (*Ogden, UT: Browning Arms Company, 1965), 33.

71 Col. Alfred Mordecai to Secretary of War Daniel S. Lamont, June 14, 1895, in *Annual Report of the Chief of Ordnance to the Secretary of War for the Fiscal Year ended June 30, 1895* (Washington: Government Printing Office, 1896), 80.

advanced machine guns, it was still seeing the practicality of a high volume of fire. Other armies were experimenting with it, too.

Although multiple nations had been testing assorted designs of machine guns, there was no full adoption of any system. The U.S., in this case, was equal to other contemporaries. Of course, the Maxim Gun had been shown worldwide, and multiple nations ordered some for testing and smaller units. The British Army was among the first to officially adopt the Maxim in 1891 and distribute it through their dominions.[72] Even before the adoption of the Maxim Gun, the British had seen some major successes in their colonial expeditions in Southern and Central Africa.[73] It would see usage around the same time the U.S. was using its machine guns in the Spanish-American War. While the U.S. was delaying the adoption of a machine gun, the rest of Europe looked at the practicality of the weapons. It is important to note, though, that all of the influential designers of machine guns were Americans, but their designs were first manufactured in Europe.[74]

Maxim was born in Maine and set up factories throughout Europe to produce his machine gun. Browning set up shop in Utah in the mid-1880s and sold many of his designs to American companies, but he was also well-connected to Fabrique Nationale (FN) in Belgium. Other key machine gun inventors included Benjamin B Hotchkiss and Col. Isaac N. Lewis, both from Connecticut and Pennsylvania. Both had key designs utilized during the First World War, but their designs originated in the U.S. around the turn of the nineteenth to the twentieth century. Though manufacturing plants were set up

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72 "Canada & The South African War, 1899-1902" *Canada War Museum*, accessed October 30, 2023, https://www.warmuseum.ca/cwm/exhibitions/boer/maximmachinegun_e.html#:~:text=The%20British%20Army%20first%20adopted,operate%20entirely%20by%20mechanical%20means.

73 Chivers, *The Gun*, 93.

74 Lockhart, *Firepower: How Weapons Shaped Warfare*, 296.

in other industrialized countries, the very first designs of machine guns originated in the U.S., showing how important the American arms industry was to armies and the small arms they utilized during the "Revolution in Firepower."[75] The U.S. Ordnance Department would not adopt recoil-operated machine guns immediately, even though the U.S. had leading designs. Of all the nations that had invented their machine guns, the U.S. became the exception and one that did not adopt machine guns at the outset, because of its smaller numbers comparatively.[76]

Machine guns would become one of the most essential assets in an infantry's arsenal at the turn of the twentieth century. The U.S., in many ways, was at the forefront of machine gun technology, but the Ordnance Department lagged in their adoption. Inventors like Hiram Maxim were born in the United States but had their first commercial sales in other industrialized countries. The Ordnance Department assessed some of the guns at the leading edge of advancement, like the Maxim and Colt Automatic Gun, but only a small batch was ordered. While small orders were placed over the next twenty years, the concepts and organization of machine-gun tactics were still in their infancy. Outside the Ordnance Department, those ideas started to be developed into practice and theory by officers like Edward B. Williston and Alexander Dyer. The whole concept of the machine gun was not lost on the U.S. Army, though in 1897, the U.S. ordered thirty-one additional Gatling Guns in the new cartridge.[77] The machine gun was not the sole revolutionary technology of the time. Instead, it was the culmination of many concepts and ideas. The small arms of this period had developed so quickly that within the span of

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75 Malcolm W. Browne, "100 Years of Maxim's Killing Machine," The New York Times, November 26, 1985, sec. A, 1.

76 Lockhart, *Firepower: How Weapons Shaped Warfare*, 297.

77 Flagler, *Report of the Chief of Ordnance Year 1897*, 29.

ten years, all other firearms had become obsolete, which would be a significant problem for the U.S. in the Spanish-American War, especially in Cuba.

At the start of the 1880s, the U.S. started considering how the advancements in small arms technology would affect the future of U.S. military service weapons. Starting with the new development of cartridge magazines in 1882, the initial trials led to the U.S. not adopting a magazine repeating firearm while other nations were starting to adopt them. Meanwhile, other crucial technologies, including smokeless powder and bolt action firearms, had become prominent. The U.S. was on par with all the other major powers when considering these new inventions in 1888, but nothing had been approved again. It took another four years for the U.S. to adopt the Krag Jorgenson, its first magazine-repeating rifle issued to all servicemen.

Simultaneously, the first recoil-operated machine guns were invented because of crucial breakthroughs in powder technologies. The U.S. had already adopted hundreds of manually operated Gatling Guns, as machine guns had been a well-appreciated concept since the end of the American Civil War. The U.S., like many other nations took particular interest in the first iterations of the Maxim Gun. It concluded that it was important for future conflicts but lacked the foresight to apply such weapons. Many of the machine guns of the 1880s were first invented in the U.S. but were built and utilized by European countries such as Britain, Germany, and France. The U.S. continued to utilize its Gatling Guns, ordering them through the 1900s in more updated cartridges.

For all these crucial advancements in arms technology, the U.S. was still apprehensive to adopt them. The U.S. Ordnance Department was deeply aware of the advancements in small arms technology. They were constantly evaluating the newest

technology produced in the U.S. and abroad. It was deemed that although the newer technology had an advantage compared to older models, the older service weapons would do fine for wars the U.S. engaged in during the late 1880s. Although intense at moments, fighting on the American Plains was not disastrous or taxing enough for the U.S. to look at technology as a solution. Combined with a shrinking army, there was no desire to equip the force with the newer and slightly more complicated rifles and machine guns of the 1880s.

The associated costs of reequipping the army were never a real issue regarding Congress funding such arms manufacturing. During the 1882 magazine trials, congress appropriated fifty thousand dollars for research and examination of a potential service rifle. While these trials did not amount to a new service rifle, Congress still allocated funds to future trials. The only example of Congress reaching out to control these trials was during the 1891 trials that resulted in the Krag-Jorgenson trial. Here, Congress saw that the U.S. Ordnance Department was looking to adopt a foreign rifle, and they withheld the 400,000 dollars unless American inventors could resubmit their own designs.[78] Ordnance allowed for another round of tests, but ultimately, the Krag-Jorgenson won again. Congress dropped its concerns and released the funds for the new magazine rifle. The issue of funding was never the real hold on adopting a new service weapon. Instead, it was the conservative army officers who disliked changing the service weapon.

The conservatism in the army regarding change had some major voices and they looked to past and more recent experiences to back their claims that no change in

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[78] Sidney B. Brickerhoff and Pierce Chamberlin, "The Army's Search for a Repeating Rifle: 1873-1903", *Military Affairs* 32. No. 1 (Spring 1968), 29.

machine guns and rifles needed to happen. The army, into the 1890s, was still combating small pockets of Native resistance in the Great Plains and had little intention of switching rifles if there wasn't a major threat.[79] The slow adoption of these new rifles was because of such reluctance in the U.S. Army towards newer technology. The transition from the Trapdoor to the Krag is a great example of this, where initial trials to replace the obsolete breech loader failed because army personnel thought it best to stick with what was known. The guardians of the army stuck with their old principles, where some of the new officers saw the potential but had little power to change the non-adoption of new small arms technologies.[80] This ultimately shifted once the U.S. entered a more modern conflict at the turn of the 19th century.

Everything changed as the U.S. declared war on Spain. Now, the U.S. was fighting in the Caribbean and the Philippines. Here, the U.S. would be fighting against a declining global power but, in incidents, would face a more technologically superior enemy regarding small arms. The U.S. would react by investing more in its manufacturing capabilities, adopting a new service rifle and pistol, and reconsidering the idea of recoil-operated machine guns. The U.S. primarily took inspiration and ideas from traditional wars and insurgencies they had fought in the first decade of the 20th century. Even after the war with Spain, the U.S. fought in more minor conflicts that would impact the U.S. Army's service weapons. The experiences from 1898 to 1905 catalyzed the U.S. Army to invest in new small arms technologies. What the U.S. Ordnance Department

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79 Edward M. Coffman, *The Regulars: The American Army 1898-1941* (Cambridge: Harvard University Press, 2004), 21.

80 Linn, *The Echo of Battle, 62.*

would learn from this period was that technology had to be understood and utilized for it to affect its fighting capabilities.

Chapter Two: The Spanish-American War and the Decade of Adaptation

On the night of February 15, 1898, at 9:40 pm, the city of Havana was rocked by a massive explosion.[1] There was terrible confusion in the harbor; some thought the explosion was caused by a bomb set off by the Spanish or two ships colliding with one another. To the horror of onlookers, the explosion came from the *U.S.S. Maine*. One of two new armored cruisers, the *Maine*, had been sent to Cuba as a show of force to protect U.S. interests on the island. Now, it was burning and sinking in Havana Harbor. The debate over what caused the explosion and the death of 266 sailors still goes on today; most historians agree a magazine explosion caused it, but in the aftermath of the explosion, the U.S. would be at war with Spain and its colonial possessions.[2] The demands of war were taxing on many levels. It would be paramount that the U.S. Army be provided with the arms and weaponry to defeat the Spanish in Cuba and the Philippines. The Spanish-American War did not begin right after the sinking of the *Maine*; instead, there was over a month of investigation of the cause of the explosion. Massive public outcries against the destruction of the *Maine* in a way that united the nation, both north and south, not seen during Reconstruction, and public pressure played a major factor in the declaration of war.[3] Although the war with Spain lasted only six months, it had a drastic effect on the procurement of future small arms and the doctrinal use of machine guns.

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1 Graham A. Cosmas, *An Army For Empire: The United States Army in the Spanish-American War* (Columbia, MS: University of Missouri Press, 1971), 3.

2 Clay Risen, *The Crowded Hour: Theodore Roosevelt, The Rough Riders, and the Dawn of the American Century* (New York: Scribner, 2019), 55.

3 John Oldfield, "Remembering the Maine: the United States, 1898 and Sectional Reconciliation," in *The Crisis of 1898: Colonial Redistribution and Nationalist Mobilization*, ed. Angel Smith and Emma Dávila-Cox (New York City: St. Martin's Press, 1999), 59.

Small arms technology had progressed rapidly through the last three decades of the nineteenth century. Technologies such as smokeless powder and bolt action repeaters had become common in Western armies. The U.S. Army was no exception, adopting the Danish Krag-Jorgensen rifle in early 1892.[4] Although it seems outdated, it was a respected rifle that was on par with other repeating rifles of the time. In addition to the service rifle, another significant change in small arms technology was the advent of machine guns. Although the U.S. Army did not adopt weapons like the Maxim Machine Gun, early machine guns such as the Gatling Gun were in the U.S. Army arsenal. Although the Krag and Gatling guns were some of the most advanced equipment for the infantry when the U.S. fought the Spanish-American War, the Spanish equipment drastically affected the U.S. adoption of small arms moving forward.[5]

The Spanish-American War was the catalyst of change for the U.S. Ordnance Department. Specifically, considering the adoption of small arms, the Spanish utilized a more advanced design than their American counterparts, namely the Mauser Model 1893.[6] This chapter will explore and answer what weapons the U.S. Army faced when it was in Cuba and the Philippines, how it compared to American small arms, and what effect it had in the following decade after the conclusion of hostilities. Within the decade, U.S. Army observers were present during the Russo-Japanese War and created their own ideas on the future of small arms and warfare in general. The first decade of the twentieth century saw the United States Army adopt a new service weapon, the Springfield Model

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4 John Pitman, *The Pitman Notes on U.S. Martial Arms and Ammunition: Volume Four U.S. Magazine Rifles and Carbines, Cal. .30* (Gettysburg, PA: Thomas Publications, 1992) 10.

5 Brian Wallin, "Infantry Weapons in the Spanish-American War: Forging New Directions," *Varnum Continentals*, accessed February 5, 2024, https://varnumcontinentals.org/2015/10/feature-article-infantry-weapons-in-the-spanish-american-war-forging-new-directions/.

6 General Nelson A. Miles, "The War with Spain I," *The North American Review* 168, no. 510 (May 1899): 17.

1903, in line with what they had faced in Cuba.[7] Although it had adopted a new rifle, the U.S. machine gun doctrine still lagged in appreciating what authentic machine guns could bring to future warfare.

One of the most complex parts of researching the employment of firearms in battle is identifying which small arms were utilized. This problem is evident in secondary literature as much as in primary sources. Most often, there will be references to soldiers firing their rifles or taking fire from snipers and machine guns. Both documents show an exchange of fire, but neither details precisely what is being used. So, to understand what is going on in these sources, certain context clues like phrases such as "clattering of bolts" or the use of smokeless powder help to garner insight.[8] This applies to both sides of the Spanish-American War; however, this chapter looks more at the American perspective and small arms. Other sources, such as photographs and writings from soldiers, help document what firearms are being used. The use of more technical firearms literature helps to establish the basis for what was most likely present in the field.

The Old and the New Going to War

During the months between the explosion of the *Maine* and the declaration of war against Spain, the U.S. prepared to go to war. Within the U.S., there was plenty of suspicion that Spain was at fault for the sinking of the *Maine*.[9] President McKinley tried to sway the American public to withhold judgment of the incident but to no avail. Newspapers across the U.S. called for the punishment of Spain and its expulsion from the western

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7 Bruce N. Canfield, *A Collector's Guide to the '03 Springfield* (Lincoln, RI: Andrew Mowbray Publishers, 1989), 17.

8 G.J.A. O'Toole. *The Spanish-American War, An American Epic* (New York: W.W. Norton and Company, Inc., 1984), 238.

9 John L. Offner, "McKinley and the Spanish-American War," *Presidential Studies Quarterly* 34, no.1 (March 2004): 56.

hemisphere, ending their op-eds in "Remember the Maine."[10] As Louis A. Pérez Jr. points out, "the public did not merely resign itself to the possibility of hostilities; on the contrary, it demanded the prosecution of war."[11] Under pressure from the American public and Congress, McKinley, on March 9th, 1898, signed a 50-million-dollar appropriations bill in preparation for a war with Spain.[12] While this increase in funds for the military had been signed, the investigation of *Maine's* wreckage was still taking place. The Spanish and American reports came to different conclusions, which did not help the growing tensions between the two countries. By April 19th, Congress authorized raising an additional 125,000 volunteers to join the already enlisted regulars.[13] A few days later, the Spanish declared war on the United States on April 22, 1898.

With the raising of over 125,000 men in addition to the army regulars, the U.S. needed to dig deep into storage to equip them.[14] The standard issue rifle of the U.S. Army was the Krag-Jorgensen Model 1896 rifle, and at the start of the war, Springfield Armory had produced only about 30,000.[15] The Model 1896 was a magazine-fed smokeless powder rifle with multiple updates to the original Model 1892. Most of these were already in the hands of the slightly over twenty-six thousand regulars, meaning there were very few to give out to the volunteer regiments.[16] The U.S. Army had to fall back on

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10 "Excerpt from an editorial demanding "the punishment of Spain for the Maine massacre"" Newspapers.com, April 12, 1898, accessed February 5, 2024, https://www.newspapers.com/article/-excerpt-from-an-editorial-demanding-th/31886565/.

11 Louis A. Pérez Jr., *The War of 1898: The United States and Cuba in History and Historiography* (Chapel Hill: The University of North Carolina Press, 1998), 65.

12 O'Toole. *The Spanish-American War, An American Epic*, 142.

13 Edward M. Coffman, *The Regulars: The American Army 1898-1941* (Cambridge: Harvard University Press, 2004), 5.

14 Ivan Musicant, *Empire by Default: The Spanish-American War and the Dawn of the American Century* (New York: Henry Holt and Company, 1998), 189.

15 Bruce N. Canfield, "The Krag-Jorgensen: America's First Bolt-Action Service Rifle," *American Rifleman,* accessed January 3, 2024, https://www.americanrifleman.org/content/the-krag-jorgensen-america-s-first-bolt-action-service-rifle/.

16 O'Toole. *The Spanish-American War, An American Epic*, 197.

the old Trapdoor Springfield, a single-loading black powder rifle to arm the rest of the volunteers. Having produced this rifle for the past several decades, there was plenty to pull out of storage, but it was obsolete compared to more modern rifles it would face. Instead of waiting for more Krag rifles to be built, the army issued what it had.[17] This combination of modern and obsolete rifles, in conjunction with the lack of training for the volunteers, influenced the U.S. Army operations, especially when it landed in Cuba.

As the war opened, many of the volunteer regiments moved to southern Florida in preparation for the invasion of Cuba. In Florida, they were trained to handle their respective rifles. It wasn't that the Trapdoor was inefficient in its capabilities; Private Charles Johnson Post of the Seventy-First praised the stopping power of the .45 caliber slug. Jokingly, he stated, "It could knock down two men, the one it hit and the one who fired it."[18] The two main issues with the trapdoor were that it was single-loading and used a black powder cartridge. Both technologies had been obsolete since 1886. Ultimately, the volunteers were sent to Cuba, the Philippines, and Puerto Rico with the Trapdoor. Units like the Second Massachusetts Infantry used their black powder rifles against the Spanish Mausers during the Battle of San Juan Hill.[19] One regiment that was heavily involved in the Battle of San Juan Hill, The Rough Riders, gives direct information on the firearms it was equipped with and what they faced.

One of the more well-known regiments of the Spanish-American War, the Rough Riders under Colonel Leonard Wood and Theodore Roosevelt, serving as lieutenant

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17 Benjamin Franklin Cooling, *Arming America Through the Centuries: War, Business and Building a National Security State* (Knoxville: The University of Tennessee Press, 2022), 102.

18 O'Toole. *The Spanish-American War, An American Epic*, 232.

19 Red Reeder, *The Story of the Spanish-American War* (New York: Hawthorn Books Inc., 1966), 124.

colonel, had an important role in the American victory in Cuba. Famously, this was the First Cavalry Volunteer Regiment, composed of cowboys and plainsmen from the American West.[20] When organized, they were sent down to Florida for additional training and were issued their equipment. Wood worked with Roosevelt to equip the Rough Riders with the army's standard issue for the cavalry, the Krag-Jorgensen model 1896 cavalry carbine. The main difference to the standard infantry model was that the carbine was shorter in overall length, making it more viable as a weapon usable on horseback. Roosevelt notes that Wood realized the Krag's advantage, especially its use of smokeless powder and the logistical support with regular army units. Wood was able to get the Rough Riders equipped with the Krag carbine with "utmost vigor and promptness" in time for the Rough Riders to be sent to Cuba.[21] Unlike the other regiments sent to Cuba, the Rough Riders were also equipped with one of the first recoil-operated machine guns.

On their expedition, the Rough Riders were not equipped with Gatling guns; instead, they had two brand new Colt Automatic Guns. As noted in the previous chapter, the U.S. Ordnance Department had tested the Colt Guns and decided not to adopt these early machine guns. Sergeant William Tiffany and other New York donors gifted the two Colt machine guns to the regiment.[22] The Rough Riders used the Colt guns sparingly, and Roosevelt initially had multiple qualms. First, they were mounted on heavy tripods, which had to be carried by men, unlike the Gatling Guns, which used mules for transport. Second, they did not use either .30 Krag or .45-70 cartridges, which were standard issue

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[20] John C. Rayburn, "The Rough Riders in San Antonio, 1898" *Arizona and the West* 3, no. 2 (Summer, 1961): 113.

[21] Theodore Roosevelt, *Rough Riders: An Autobiography,* ed. Louis Auchincloss (New York: The Library of America, 2004) *18.*

[22] Risen, *The Crowded Hour,* 99.

cartridges for the U.S. Army. They were chambered in the 7x57 cartridge used by the Spanish. In order to use the machine guns, the Rough Riders, once out of the initially allotted ammunition, had to capture Spanish supplies.[23] The Colts were later given to Lt. Parker in addition to the four Gatling guns the Army sent over during the invasion of Cuba. U.S. troops landed in Cuba on June 22, 1898, and immediately faced resistance from the Spanish and their technologically superior small arms.[24]

American forces with the Trapdoor Springfield and the Krag-Jorgensen went up against similar rifles, but their opponents' small arms were ultimately superior to the ones they were issued. The first rifle that has received less attention but was also popular in the American West and in some state militias was the Remington Rolling Block. The Rolling Block was developed in the United States right after the Civil War and was a successful rifle being sold to multiple nations, including Spain.[25] The Spanish military ordered the Rolling Block in 1871 in a black powder chambering but made an upgrade known as the M71/89 that utilized a smokeless powder round.[26] This rifle is similar to the American Trapdoor, a single-shot, breach-loading rifle, for comparison. The most important difference was that the Rolling Block utilized a smokeless cartridge, allowing the shooter to conceal its position, which is especially important for jungle warfare. The other rifle that drastically impacted American small arms was the Spanish Mauser M1893.

The Mauser rifle originated in Germany in 1871, and by 1891, it had developed into one of the most successful military rifles in the world. The Spanish had experience

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23 Roosevelt, *Rough Riders,* 133.

24 Risen, *The Crowded Hour*, 148.

25 Garry James, "Remington Goes to War," *American Rifleman*, accessed January 3, 2024, https://www.americanrifleman.org/articles/2016/5/16/remington-goes-to-war/.

26 David A Thombs and Stephen P Barrett, "The Internet and Firearms research with reference to the .43 Spanish Remington Rolling-Block and its Ammunition," *The Journal of the Historical Breechloading Small Arms Association* 4, no. 4 (2012): 21.

with the Mauser for a few years, ordering some of the M1892 pattern. Slow improvements of the M1892 led to the adoption of the M1893 with one main difference: instead of having a single stack of cartridges, the cartridges would be staggered in the magazine that was now flush with the stock.[27] The M1893 could also be fed by a stripper clip, allowing rapid cartridge reloading instead of single loading like the American Krag. This feature had the most significant impact on the next rifle adopted by the U.S. Army. After the Spanish-American War, the U.S. Ordnance Department developed its version of a Mauser rifle, copying the action and cartridge loading mechanism. Multiple accounts depict American soldiers being shot at by the M1983 as the "Mauser bullets."[28] In combat, the Rough Riders and Roosevelt detailed the benefits of the Krag but also the superiority of the Mauser M1893.

Many accounts of the Battle of San Juan Hill and the Rough Riders' involvement show which small arms were active in the battle. The Mauser, during the battle, sent a withering amount of fire at the American soldiers.[29] Mass fire and quick reloading from the stripper clips drastically raised the Spanish's combat capability and affected the American invasion. In addition, the usage of smokeless powder allowed the Spanish to have better concealment in the thick vegetation. Roosevelt notes that he and his Rough Riders anxiously looked at the jungle foliage to find where the enemy was but could not detect the Spanish because of the lack of a smoke signature.[30] The Spanish also used sharpshooters to the most significant effect. Although the Mauser rifle was, and still is, an

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27 John Walter, *Rifles of the World: World's Definitive Guide to Centerfire and Rimfire Rifles* (Iola, WI: Krause Publications, 2006), 307.
28 Risen, *The Crowded Hour*, 163.
29 Cosmas, *An Army for Empire,* 214-215.
30 Roosevelt, *Rough Riders,* 133.

excellent rifle for sharpshooting, the few documented cases of Spanish sharpshooters had them using the Remington Rolling Block.[31] The Spanish Mauser and the older Remington Rolling Block hindered the American movement at the Battle of San Juan Hill because of their overwhelming firepower and technology. During this time, the Krag and the Trapdoor Springfield were pushed into heavy combat for the first time. The reality was that the American Army's small arms were outclassed by a declining power, and through combat, it showed.

The U.S. had run into multiple issues with their service rifles during combat in Cuba. One issue was that the Trapdoor Springfield still used black powder cartridges. The black powder cloud, easily giving away the position of the shooter, was one of the more significant disadvantages the volunteers faced. Still, there are documented cases of American soldiers equipped with the Trapdoor performing very well in theater. The Gallant Seventy-First guarded the regimental camp when they spotted supposed Spanish movement on the outskirts. Private Post of the Seventy-First fired his Trapdoor first into the dense jungle, and slowly, more Trapdoor Springfields opened fire.[32] What the Seventy-First did not realize was that they were firing on land crabs that were very fast and disturbing lots of foliage in the jungle. Although the Seventy-First went on to fight in other battles, their usage of black powder had almost rendered them useless.[33] The Krag, on the other hand, was a smokeless rifle, but it suffered from slow and fumbled reloads.

In some ways, the Krag was similar to the Spanish Mauser. They fired a smokeless round, used a bolt-action mechanism to reload the rifle, and used a magazine

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31 Roosevelt, *Rough Rider*s, 137.
32 O'Toole. *The Spanish-American War, An American Epic*, 292.
33 Roosevelt, Rough Riders, 114.

to hold the ammunition. The main difference, though, was the way they replenished the magazine. The Mauser used a stripper clip, allowing five rounds of ammunition to be reloaded in one motion, whereas the Krag had to be reloaded one round at a time.[34] It was much easier to reload using the Mauser stripper clips, and the Rough Riders complained that they dropped hundreds of live rounds during the Battle of San Juan Hill as they had fumbled with the loose cartridges.[35] In the interim, before adopting the Springfield Model 1903, the U.S. Ordnance Department tried to fix this issue by adapting the Krag to use a stripper clip. Still, this project went nowhere since a new service rifle was being developed and soon adopted.[36] The lack of quick reloading hampered the Krag and was one of the biggest lessons from the Spanish-American War regarding the future of the U.S. Army's small arms.

In addition to the rifle, the new machine guns played a crucial role during the U.S. campaign in Cuba. Right away, there was trouble utilizing the Gatling guns in Cuba. The first major problem was the weight of the Gatling Gun, and its carriage made it extremely difficult to get off the transport ships and onto Cuban soil. Lt. John H. Parker, in charge of the American Gatling Guns, wanted to get his guns into position to help with the Battle of San Juan Hill, but there were no barges large enough to transport them. Through direct, stern discussion with the landing force and Roosevelt's written request for the Gatling Guns, they were finally offloaded onto shore in time for action.[37] From there, they were transported to the front, where Roosevelt commended the bravery of Lt. Parker for

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[34] J.C. Stewart, *Cowboys in Uniform: Uniforms, Arms, and Equipment of the Rough Riders* (Show Low, AZ: Rough Riders Publishing Co., 1998), 45.

[35] C&Rsenal, "*Small Arms of WWI Primer 063: U.S. Krag-Jorgensen Model 1898,"* YouTube video, 1:46:38. November 6, 2017, https://www.youtube.com/watch?v=oQAqNqaiQwY.

[36] Lt. Col. William S. Brophy, *The Krag Rifle* (North Hollywood, CA: Beinfield Publishing Inc., 1986), 124.

[37] Reeder, *The Story of the Spanish-American War,* 124.

pushing the guns so close to the frontlines and helping pin the Spanish forces down during the Battle of San Juan Hill as the Rough Riders and the 10th Cavalry advanced.[38] The Gatling Gun helped lay down fire and allowed the American infantry to push up Kettle Hill and disperse the remaining Spanish soldiers.[39] The Gatling Guns and Parker's leadership proved so effective that Roosevelt put Lt. Parker in charge of his two Colt Automatic Guns.[40] These guns continued to prove themselves useful during the campaign in Cuba.

The Gatling and the Colt Automatic Guns were used in offensive and defensive operations. The Gatling Guns and Colt guns were pushed up to the Siege of Santiago next to the other artillery pieces.[41] This was primarily the role of the machine guns of the time, using them as light artillery pieces to shell the enemy and keep them pinned while the troops advanced, not advancing with the infantry. The machine guns of the time were still heavy and hard to move, so doctrine had them placed farther in the rear for defensive operations. The Gatling Guns and Colts were noted to be effective against Spanish snipers as they allowed for a large amount of firepower to be directed against a particular area.[42] This further illustrates the machine gun's role as a piece of artillery used to suppress an area. Other parts that the machine guns helped with were protecting key locations, including trenches. In this role, Lt. Parker removed the wheels of the Gatling carriage and placed the Gatling and Colts in defensive positions. This occurred particularly before the Siege of Santiago when the Gatling crews called the camp Fort

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38 John J. Pershing, "The Campaign of Santiago," in *Under Fire with the Tenth U.S. Cavalry,* ed. William Loren Katz (New York City: Arno Press, 1969), 208.

39 David A. Armstrong, *Bullets and Bureaucrats: The Machine Gun and the United States Army, 1861-1916* (Westport, CT: Greenwood Press, 1982), 101.

40 Stewart, *Cowboys in Uniform*, 53.

41 Stewart, *Cowboys in Uniform*, 53.

42 Roosevelt, *Rough Riders*, 136.

Roosevelt.[43] The Siege of Santiago lasted two weeks and was the last major operation of American forces in Cuba during the Spanish-American War.[44] Besides the combat in the Caribbean, U.S. forces saw action in Southeast Asia when the American Army became involved in the Philippine resistance to Spanish colonialism.

The Philippines had been in a state of rebellion since 1896 and the rise of Emilio Aguinaldo. Aguinaldo and his Filipino allies declared independence from Spain in 1897, and Aguinaldo was captured and exiled, but the struggle for rule over the Philippines lasted into 1898.[45] President McKinley instructed the American forces under Maj. Gen. Wesley Merrit that the American expedition had two purposes: to reduce Spanish power and provide order and security to the islands while in U.S. possession.[46] Taking possession of the Philippines involved sending regulars and volunteers to the Pacific islands. Just like the American forces being sent to Cuba, the soldiers weren't sent with the Krag rifle. Instead, they would be sent over with the black powder Trapdoor.[47] The Siege of Manila was an odd combination of spurts of intense fighting and easy surrender as the siege included the Spanish, Filipinos, and Americans.

The Siege of Manilla started when the American Squadron from Hong Kong sailed to the outskirts of Manilla Bay. Aboard one American ship was Emilio Aguinaldo, who had been granted passage back to the islands by Admiral Dewy.[48] The Battle of Manilla Bay started with the American squadrons led by the *U.S.S Olympia* steaming into the bay and bombarding both the anchored Spanish ships and the shore batteries. The

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43 Cosmas, *An Army For Empire,* 225.
44 Albert A. Nofi, *The Spanish-American War, 1898* (Cambridge: De Capo Press, 1997), 210.
45 Brian McAllister Linn, *The U.S. Army and Counterinsurgency in the Philippine War, 1899-1902* (Chapel Hill: The University of North Carolina Press, 1989), 5.
46 Linn, *The U.S. Army and Counterinsurgency in the Philippine War, 1899-1902,* 2.
47 Linn, *The U.S. Army and Counterinsurgency in the Philippine War, 1899-1902,* 3.
48 Ivan Musicant, *Empire by Default,* 547.

bombardment of the Spanish holdings lasted for two hours but crippled the Spanish fleet. The American people and government praised Admiral Dewey, equating his actions to those of Admiral Horatio Nelson.[49] With the Spanish fleet destroyed, the American forces under Brig. General Anderson looked to land at Cavite, which was close to Manila. Since Admiral Dewey controlled the bay, The American forces landed without much opposition and started preparing to march on Manila.[50] Reinforced by General Merritt's forces from mainland U.S., the Siege of Manila had begun.

During the Siege of Manila, the Filipinos and American forces did not work together. Their relationship was fraught, and they ultimately had competing goals. The Filipinos under Aguinaldo wanted complete independence from foreign powers, and the Americans looked to expand their empire. The idea of taking the Philippines was an exciting proposition, as Fredrick Jackson Turner had just explained that the U.S. had lost its frontier nature. The Philippines and Cuba presented an opportunity to continue American expansion.[51] The Spanish guarding the city of Manila were surrounded by the Filipino rebels and sealed in by the American Navy. The Spanish Commander understood the dire nature of the situation and communicated to the Americans that he would surrender to them but not the Filipinos.[52] Merritt and the Americans agreed to the Spanish surrender, but to save both Spanish and American honor, they agreed to have a staged battle. With enough gunfire to satisfy both sides, the Spanish surrendered the city, and American soldiers occupied the once-Spanish positions against the Filipinos on August

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49 Ivan Musicant, *Empire by Default,* 233.
50 Cosmas, *An Army For Empire,* 238.
51 O'Toole. *The Spanish-American War, An American Epic*, 91.
52 Linn, *The U.S. Army and Counterinsurgency in the Philippine War, 1899-1902,* 8.

13, 1898.[53] The Treaty of Paris was signed in December 1898 and took effect in Apr. 1899, ending the Spanish-American War with the U.S. annexation of the Philippines.[54]

Feeling betrayed by the American forces, Aguinaldo and other rebellious Filipino tribes continued to fight the Americans. Aguinaldo believed that the U.S. forces had come to support the operations and read Admiral Dewey's actions as such, but the insurgent leaders and Washington did not have a formal agreement on the future of the Philippines.[55] Though the Treaty of Paris ended the fight against the Spanish, the Philippine Insurrection resulted from American occupation. The Philippine Insurrection was roughly divided into three different regions corresponding to the main island chains: Luzon, Mindanao, and Visayas. The fight against the Filipinos proved different compared to the war against Spain. In the Luzon District, Aguinaldo tried to adopt a more European style of war, that being mass armed formations; he ultimately had to revert to guerrilla tactics to attempt to defeat the Americans.[56] Aguinaldo intended to protract the war in hopes that the U.S. Army would break down and the American public would demand withdrawal. They often made small-scale attacks on weak garrisons and supply wagons on coastal roads.[57] Brian McAllister Linn argues that the U.S. Army was meant to fight off other European powers, but it ended up fighting against another version of the frontier war. This time, not on the American plains fighting against Native Americans, but

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53 Charles Henry Butler, *The Treaty-Making Power of the United States* (New York: The Banks Law Publishing Co., 1902), 441.

54 Whitelaw Reid, *Making Peace with Spain: The Diary of Whitelaw Reid*, ed. H. Wayne Morgan (Austin: University of Texas Press, 1965), 17.

55 Ivan Musicant, *Empire by Default,* 550.

56 Brian McAllister Linn, *Guardians of Empire: The U.S. Army and the Pacific, 1902-1940* (Chapel Hill: The University of North Carolina Press, 1997), 11.

57 Linn, *The U.S. Army and Counterinsurgency in the Philippine War, 1899-1902,* 41.

Filipino insurgents.[58] Fighting the Philippine insurgency raised an essential question for the American occupying force: should friendly allied Filipinos be armed, and if so, with what?

Initially, the Philippine Scouts were formed as a constabulary force and were armed with obsolete black powder rifles. The common practice was giving the scouts older Trapdoor rifles because if they were stolen, they were more obsolete than the newer and more capable Krag rifles.[59] Additional U.S. regulars had to be sent to the Philippines through growing pressure from General William H. Carter, Commander of the Department of Visayas, a set of islands in the Philippines, and Governor-General William Howard Taft. In addition to more U.S. regulars, Carter's nine scout companies were to be equipped with modern magazine rifles.[60] The Scouts and Philippine Constabularies were equipped with their version of the Krag rifle, commonly known as the Model 1899 Constabulary Carbine. The two major changes to the standard Krag rifle were the modification to take a blade-style bayonet and the overall shortening of the rifle and stock.[61] Besides arming the constabulary force in the Philippines, American Regulars faced the Moro insurgency, which impacted the future small arms procurement in the Army, especially regarding pistols.

Although not the most common small arms in the U.S. Army, the expedition into the Philippines drastically affected the Ordnance Department's procurement of pistols. The standard issue service pistol in the U.S. arm was the Colt Double Action model 1892

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58 Brian McAllister Linn, "The Long Twilight of the Frontier Army" *Western Historical Quarterly* 27, no. 2 (Summer, 1996): 154.

59 Linn, *Guardians of Empire,* 28.

60 Linn, *Guardians of Empire,* 33.

61 Franklin B. Mallory and Ludwig E. Olson, *The Krag Rifle Story* (Ann Arbor, MI: Springfield Research Service, 2001), 119.

revolver in .38 caliber.[62] With smokeless powder and higher-pressure cartridges, the U.S. Army transitioned from a .45 caliber cartridge to a .38 cartridge. This was similar to what other countries were doing at the time, going to a lighter bullet and smokeless powder, but when put to the test in the Philippines, they found it insufficient to stop sudden enemy attacks. The Mindanao District was primarily fought in a guerilla campaign, with American patrols on the islands and Moro tribesmen attacking indiscriminately. The surprise sudden attacks of Moro people, primarily known as the "Juramentados," referring to a Moro swordsman who attacked and killed in a suicidal act.[63] The supposed stopping power of the .45 cartridge and other large-diameter small arms were considered essential by soldiers on patrol in the Philippines. Contemporary research has indicated that these attacks may not have had a drastic effect on the U.S. Ordnance Department adopting a new .45 cartridge, but the suicidal attacks did influence American soldiers and officers like Gen. John Pershing.[64] The fighting in the Mindanao district was similar to the other districts, including the Visayas District.

The main force that the U.S. Army faced in the Visayas was the Pulahanes. Largely operating similarly to Aguinaldo and the Moros, the Visayas ambushed their targets, which included the U.S. Army and Philippine Constabulary. In one incident, over a thousand Pulahanes fighters engaged thirty-eight constabularies. Although this engagement was costly for the Pulahanes, losing an estimated three hundred dead, it was

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62 Stewart, *Cowboys in Uniform*, 47.

63 Alan R. Luga, "Muslim Insurgency in Mindanao, Philippines" (Ft. Lawrence, KS: U.S. Army Command and General Staff College, Masters Thesis, 2002), 10.

64 C&Rsenal, *"Small Arms of WWI Primer 102: Colt 1909 and 1917 Revolvers,"* YouTube Video. 40:29, July 1, 2019, https://www.youtube.com/watch?v=0gxUHlmISX8.

an example of the Pulahanes' boldness and guerilla attacks.[65] The Philippine insurgency was largely a conflict, where the U.S. Army employed counterinsurgency tactics to quell a rebellious population. Although thousands fought against U.S. rule over the island, the insurgency failed to win against the U.S. Army and Philippine Constabulary. The Philippine insurrection did impact American small arms, with further development of the Krag and future pistol trials. However, the Spanish-American War had brought many lessons to the U.S. Army's small arms and equipment. Slowly, the Ordnance Department looked to fix some issues before any potential future conflicts.

Lessons Learned: Changing the Rifle

During the war, the Ordnance Department had its highest demand for small arms since the end of the American Civil War. As more and more rifles were being taken out of storage, there was an additional need to repair damaged rifles coming from the field. What couldn't be repaired in the field was returned to Springfield Armory. The massive demand of the war led to additional arsenals, including Rock Island Arsenal (RIA), to make additional repairs and refurbishments of older Trapdoors. Although already an arsenal owned by the federal government, RIA had mainly produced artillery equipment before the war. In July 1898, RIA had eighty-five men and boys working on cleaning and repairing approximately six hundred rifles a day. At the project's conclusion, RIA had completed work on nearly fifty thousand complete rifles.[66] In addition to refurbishing the Trapdoor rifles, the Ordnance Department reported that in the fiscal year 1899, Rock

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[65] John Foreman, *The Philippine Islands: A Political, Geographical, Ethnographical, Social and Commercial History of Philippine Archipelago: Embracing the Whole Period of Spanish Rule with an account of the succeeding American Insular Government* (New York: Charles Scribners Sons, 1906), 551.

[66] Lisa Wallace, *An Illustrated History of the Rock Island Arsenal and Arsenal Island: Part 3* (Rock Island, IL, U.S. Army Sustainment Command, 2010), 168.

Island Arsenal had also repaired over 5,000 magazine rifles.[67] The experience of working with newer magazine rifles proved to be useful for potential production. The war against Spain permanently expanded the number of workers in the arsenal system; the demand for rifles had become so great that equipping the regulars and volunteers with functional small arms became a major priority for the Ordnance Department. Just as Ordnance expanded production of the model 1898 Krag-Jorgensen, they started considering adopting a new rifle that could replace the obsolete Krag.

There was a mixed reaction to the Krag rifle's service in the Ordnance Department. Some thought that the Krag served with satisfaction during the Spanish-American war, commenting on how the magazine cut-off of the Krag was still in use and well-liked.[68] Other reports drawn from experiences in the Spanish-American War told a different story. The main complaint of the servicemen was the inability to load their rifles quickly. It was a nod to the Spanish Mauser that could be loaded via stripper clip. Another problem was that the Ordnance Department looked to increase the pressure on the .30-40 Krag cartridge, but the single locking lug or the Krag could not contain the higher-pressure cartridge.[69] To fix these issues, the Ordnance Department started considering adopting a new rifle in the immediate aftermath of the Spanish-American War.

The Ordnance Department already had experience with testing the Mauser rifles; the 1891 rifle trials that had the Krag-Jorgensen become the standard service rifle also

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67 A.R. Buffington, *Report of the Chief of Ordnance to the Secretary of War for the Year 1899* (Washington: Government Printing Office, 1899), 88.

68 Brophy, *The Krag Rifle, 60.*

69 K.M. Dorsett, *Development of the Krag-Jorgensen Rifle for the U.S. Military: A Technical Assessment* (Independently Published, 2017), 115.

included the Mauser Model 1889 from Belgium.[70] The Ordnance Department in 1899 also tested three Mauser rifles and their ammunition for the future service rifle. Although these tests primarily studied the potential of a new cartridge in .30 caliber, this testing, combined with the Spanish-American War experience, pointed to the Mauser being the primary choice for a potential service rifle.[71] The first testing and adoption of the new Springfield rifle began in 1901, with a new service cartridge and an operating mechanism closely resembling the German Mauser.

In *The Report of the Chief of Ordnance of 1901*, Springfield Armory described the new gun as combining features of both the U.S. Krag and the Mauser. The locking lugs and magazine system were like the German Mauser, and the safety rib (an additional locking surface) was from the Krag.[72] The early tested rifles also included a magazine cutoff like the Krag, but this time, it borrowed from the British Lee Enfield series. The experimental models were put through a series of tests, including accuracy, dust, rust, and excessive charges. The testing board noted a few advantages and disadvantages. Ordnance appreciated the simplicity of the rifle and how it was cheaper to manufacture than the current service rifle. The strength of the action, with its dual locking lugs, was an additional advantage compared to Krag, which the Ordnance board thought necessary.[73] However, multiple parts had to be redesigned on the initial prototype before the rifle could be adopted.

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70 Mallory, *The Krag Rifle Story*, 58.

71 Buffington, *Report of the Chief of Ordnance 1899,* 184.

72 A.R. Buffington, *Report of the Chief of Ordnance to the Secretary of War for the Year 1901* (Washington: Government Printing Office, 1902), 249.

73 Lt. Col. William S. Brophy, *The Springfield 1903 Rifles: The Illustrated, Documented Story of the Design, Development, and Production of all the Models, Appendages, and Accessories* (Guilford, CT: Stackpole Books, 1985), 3.

The first problem the board mentioned was that the magazine was protruding from the bottom of the stock. The magazine's design was a single stack of cartridges, making it very narrow and tall, which meant it had to stick out the bottom of the rifle, reminiscent of the Belgian Mauser tested in 1891. Besides calling the magazine "unsightly," the board noted that the walls of the magazine were too thin and weak and were liable to damage.[74] The other problem, the board noted, was that the magazine cutoff was not working as intended. Sometimes, it came undone during firing, and the rifle would accidentally feed from the magazine. Also, unlike the Krag, the cartridge magazine could not be filled while the cutoff was activated. Although both changes were minor, the board believed it could be fixed by adopting a magazine like the Spanish Mauser and a cutoff reminiscent of the Swiss Schmidt-Rubin. [75] After the testing, the Ordnance Board started disregarding the importance of a magazine cutoff and recommended producing two new rifles, one with a magazine cutoff and one without.[76]

Over the next few years, the Ordnance Department modified the 1900 prototype, slowly incorporating new features. In 1901, Chief of Ordnance A.R. Buffington authorized Springfield Armory to build five thousand rifles for troop trials. One of the significant results of the trials was that the barrel length was reduced from 30 to 24 inches; that way, infantry, cavalry, and other services could be equipped with the same rifle.[77] This allowed for easier manufacturing, and instead of having separate service arms like rifles and carbines, all units were to be given a singular rifle. The U.S. was not the only nation that combined the rifle and the carbine into one rifle. With their Lee-Enfield

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74 Buffington, *Report of the Chief of Ordnance 1901,* 228.
75 Buffington, *Report of the Chief of Ordnance 1901,* 228.
76 Buffington, *Report of the Chief of Ordnance 1901,* 229.
77 Brophy, *The Springfield 1903 Rifles,* 11.

series of rifles, the British made this decision slightly after the U.S. in 1904.[78] After some final modifications, the Ordnance Board had one final test at Sandy Hook Proving Grounds and other forts to determine the adoption of the rifle.

Due to the significant demand for reequipping the Army and arsenals with new rifles, whether the standard Krag or the prototype rifle, Congress authorized funding the production of a new rifle. In the aftermath of the Spanish-American War, Congress appropriated $1,100,000 to produce small arms, but in 1902, the funding was increased to $1,700,000.[79] Considering that the Krag Model 1892 was being sold to the civilian market for twenty dollars a rifle, the Ordnance Department could build approximately an additional 100,000 rifles in the next couple of years.[80] However, the Ordnance Department believed that to properly equip the standing army and have enough rifles in reserve, it needed to produce 500,000 rifles. With the combined production at Springfield Armory and Rock Island Arsenal, Ordnance estimated that it would take a minimum of two and a half, perhaps up to five years, to equip the army and have enough in reserve.[81] The Ordnance board now had to choose the future rifle of the U.S. Army for production to begin.

The initial reports of the prototype rifle from Fort Riley and Fort Leavenworth both positively recommended that the 24-inch barrel model be the standard length for all services, helping the Ordnance Department decide which rifle should be the final model tested at the Sandy Hook Proving Grounds.[82] The Sandy Hook testing reports were

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78 Ian Skennerton, *.303 Rifle, No. 1 S.M.L.E. Marks III and III** (Australia: Arms & Militaria Press, 1994), 5.

79 William Crozier, *Report of the Chief of Ordnance to the Secretary of War for the Year 1902* (Washington: Government Printing Office, 1902), 7.

80 Mallory, *The Krag Rifle Story*, 100.

81 Crozier, *Report of the Chief of Ordnance 1902,* 8.

82 Canfield, *A Collector's Guide to the '03 Springfield*, 17.

extensive and provided very positive feedback on the experimental rifle. In the endurance test, the rifle fired one thousand rounds, and only one cartridge failed to fire; with close examination, the cartridge contained no gunpowder.[83] Other tests of the rifle included dust and rust in the operating mechanism, in which the bolt had to be opened with excessive force. Although this might seem like a failure, this also happened with the Krag-Jorgensen trials in 1891. The reports of the service rifles were sent back to Springfield Armory with a few modifications.

The Ordnance Board found that the general design of the rifle was suitable for U.S. service and superior to the Krag-Jorgensen rifle.[84] However, the testing board did not approve the provided stripper clips, which needed to be redesigned in the future. The board unanimously supported the adoption and manufacture of the rifle and got approval from the Secretary of War, Elihu Root, on June 19, 1903. The Ordnance Department designated the rifle as the "United States Magazine rifle, model of 1903."[85] There had been a few modifications leading up to the adoption of the rifle, but the only question remaining after the trial was the caliber of the new service rifle. The Ordnance Department and Frankford Arsenal had been developing a new cartridge to replace the .30-40 Krag but were still working out the proper dimensions and pressure of the cartridge. It would take them another three years to finalize the cartridge, causing issues for distributing the new rifles.

The design of the Model 1903 had been finalized, and a service cartridge had been introduced alongside it to closely resemble other cartridges, such as the Mauser

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83 William Crozier, *Report of the Chief of Ordnance to the Secretary of War for the Year 1903* (Washington: Government Printing Office, 1903), 70.
84 Crozier, *Report of the Chief of Ordnance 1903,* 96.
85 Crozier, *Report of the Chief of Ordnance 1903,* 11.

bullets from the Spanish-American War. The original cartridge design had a conical bullet with a rounded edge. It was known as the .30-03 because the bullet was .30 inches in diameter and was adopted in 1903. [86] Although this cartridge design was standard for the era, there also were some new developments in bullet technologies, including introducing more pointed bullets for better aerodynamics. The French adopted the design of a pointed bullet in 1898, and the Germans designed a bullet known as the "Spitzer" bullet.[87] The aerodynamic nature of the bullet allowed for greater range but presented a problem for the Ordnance Department. The already-produced model 1903s had to be rechambered for the new cartridge, which by 1904 had numbered over 200,000 rifles. These already-produced rifles were rechambered for the new cartridge in 1906, creating the .30-06 cartridge, which became the standard issue cartridge for the United States for the next 70 years. The model 1903 resulted from some lessons learned in the Spanish-American War. Although the model 1903 had been a straightforward application of those technologies, the usage and adoption of machine guns in the U.S. Army continued to be a struggle leading up to the First World War.

Post-War Changes to Machine Gun Procurement and Doctrine

Unlike the U.S. Ordnance procurement of the Model 1903, the U.S. Army did not adopt a new machine gun in the immediate aftermath of the Spanish-American War. Although Lt. Parker had helped in the offensive at San Juan Hill, machine guns like the Colt or Maxim guns did not find much favor in the U.S. Army service. One of the themes of Max Boot's War Made New shows few members of the U.S. Army figured out how to harness the machine gun's military power, and some officers lacked the wisdom to anticipate the

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86 Canfield, *A Collector's Guide to the '03 Springfield*, 311.

87 Leroy Thompson, *The M1903 Springfield Rifle* (London: Osprey Publishing, 2013), 12.

capabilities of such technologies.[88] The machine gun, combined with other technologies from the Second Industrial Revolution, helped build European dominance in the world.[89] Americans debated the machine gun's role and adoption until the mid-1900s. Instead of producing a domestic design of machine guns, the Ordnance Department outsourced the production to what Benjamin Franklin Cooling termed the Military-Industrial-Political Complex (MIPC).[90] For Cooling, the MIPC is the relationship between public and private manufacturing, providing a common defense or materials for war. While the Spanish-American War provided some tactical feedback, it was far from the only conflict that U.S. observers looked at when considering the effect of the machine gun on a larger battlefield.

In the immediate aftermath of the Spanish-American War, Lt. Parker was still a vocal proponent of the machine guns and wrote multiple books and articles describing their effect. Others in the service reported that the machine guns had great value in Cuba. Maj. Philipe Reade of the Inspector General's Corps reported that the work of the Gatling and Colt machine guns at the Siege of Santiago showed they should not be taken out of service and should become central in future schemes of organization.[91] The usage of machine guns had emboldened its followers, but it took some time and pressure for the U.S. Ordnance Department to look into adopting more machine guns. At the end of the Spanish-American War, Parker published his first book, *History of the Gatling Gun Detachment Fifth Army Corps, At Santiago, With a Few Unvarnished Truths Concerning*

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88 Max Boot, *War Made New: Technology, Warfare, and the Course of History, 1500 to Today* (New York: Gotham books, 2006), 16.

89 Max Boot, *War Made New,* 148.

90 Benjamin Franklin Cooling, *Arming America Through the Centuries,* XIV.

91 John H. Parker, *Tactical Organization and Uses of Machine Guns in the Field* (Kansas City, MO: Hudson-Kimberly Publishing Co., 1899), 11-12.

that Expedition. Here, Parker impressed a few lessons learned from the war and how machine guns could be used in the future.

To pressure some in the U.S. Ordnance Department, Parker turned to the American public to show the ideas and implementations of this new service arm tested for the first time in the U.S. Army.[92] One of the main points that Parker stressed in his work was that the machine gun could be used on both the defensive and offensive, using his experience from Santiago to back his claim. As in the past, Parker continued to create a distinction between the machine gun and artillery. As Parker observed, heavy artillery was continuously being pushed to the rear beyond 1500 yards, and there had become a problem in providing immediate fire support on the battlefield. Parker believed that to fill this gap, the U.S. Army could turn to machine guns.[93] Parker pushed for the separation of the machine guns from the artillery, as they had more potential on the front lines instead of as a form of artillery.

In his book, Parker described the difference between machine guns and artillery during the Santiago campaign. He wrote a scathing reflection of the artillery in Santiago, describing them as only firing three rounds and "compelled to seek safety in precipitate and disorderly flight." In contrast, the Gatlings remained in position during the fighting.[94] This did not garner any favor with more conservative army officers. Parker later dampened his statement but continued to press for the machine guns and artillery separation. In his second book, *Tactical Organization and Uses of the Machine Guns in*

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92 John H. Parker, *History of the Gatling Gun Detachment: Fifth Army Corps, At Santiago, With a Few Unvarnished Truths Concerning that Expedition* (Kansas City: Hudson-Kimberly Publishing Co., 1898), 12.

93 Parker, *History of the Gatling Gun Detachment,* 93-94.

94 Armstrong, *Bullets and Bureaucrats*, 104.

the Field, Parker described artillery and machine guns as being two weapons that had tactical differences and that to get the most out of a machine gun, it needed to be removed from the artillery.[95] Although Parker continued to promote reform in the army and gained support from prominent officials like Vice President Theodore Roosevelt and General Shafter, he could not reform the army by creating a separate organization from the artillery. However, this did not mean the U.S. Ordnance Department was against adopting the machine gun. Instead, they would test and evaluate multiple designs during the mid-1900s.

The first test of machine guns after the Spanish-American War occurred in the summer of 1903. The testing board had multiple objectives, including the suitable design of the machine gun and mount, how to package the accompanying ammunition, and how much ammunition should be provided.[96] By September 1903, the testing board had received a Danish rifle-mitrailleuse, Colt automatic machine gun, and two Vickers Sons & Maxim automatic machine guns. Each gun was also supplied with accessories, such as tripods, mounting carriages, and others, to be tested. The testing of the machine guns followed guidelines like those of rifles, including testing the action and operation under dust, rust, and water. In addition to testing the operation, the board also tested its accuracy when pushed out to longer ranges in a simulation of indirect fire.[97] The Colt and Vickers quickly surpassed the Danish mitrailleuse.

The Danish mitrailleuse was removed from the test because its feeding mechanism constantly failed to operate properly. The Colt operated better than the

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95 Parker, *Tactical Organization and Uses of Machine Guns in the Field,* 68.

96 William Crozier, *Report of the Chief of Ordnance to the Secretary of War for the Year 1904* (Washington: Government Printing Office, 1904), 71.

97 Crozier, *Report of the Chief of Ordnance 1904,* 75.

mitrailleuse but had significant problems feeding cloth ammunition belts. In almost all tests, the Vickers Sons & Maxim gun performed the best and was the machine gun recommended by the board for adoption by the U.S. Army.[98] With the conclusion of the testing, the Ordnance Department ordered one hundred and twenty machine guns in caliber .30. This was in the .30-03 cartridge, and later, the Vickers machine guns had to be rechambered to fit the 1906 ammunition.[99] Now that the machine guns were ordered, the U.S. Army had to design or adapt a doctrine utilizing them. Instead of creating a new doctrine, the U.S. Army continued to operate them as light artillery pieces even into the American entry into the First World War. However, the machine gun doctrine of the U.S. Army would be challenged because other foreign conflicts highlighted the usage of machine guns in war.

While the U.S. adopted the Vickers machine gun, halfway around the world, the Russians and Japanese were fighting in Korea and Manchuria. Much modern research focuses on the Battle of Tsushima and the Siege of Port Arthur. However, other battles involved land armies, including the largest machine gun battles before the First World War. The Russo-Japanese War saw the Russian infantry mainly on the defensive and the Japanese infantry on the offensive.[100] American military observers were sent to each side to report on the organization, equipment, and usage of the machine guns. Many observers saw little of the action early in the war, but later, Maj. Montgomery Macomb filed a report on the significance of machine guns. Macomb concluded that the machine guns

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98 Crozier, *Report of the Chief of Ordnance 1904,* 114.

99 William Crozier, *Report of the Chief of Ordnance to the Secretary of War for the Year 1905* (Washington: Government Printing Office, 1905), 22.

100 John T. Greenwood, "The U.S. Army Military Observers with the Japanese Army during the Russo-Japanese War (1904-1905)," *Army History* 1, no. 3 (Winter 1996), 3.

played a valuable but minor part in the war but conceded their potential on the offensive.[101]

Other observers, including Major Joseph E. Kuhn, reported that machine guns had become popular in the Japanese Army and were highly spoken of by their officers. [102]At the end of the Russo-Japanese War, the Japanese went from having few machine guns in the army to six per brigade. The usage of machine guns had increased during the war, and American observers noted their effectiveness, but at the same time, they had a hard time finding a suitable organizational scheme to utilize them. The Japanese showed effectiveness in raiding Russian positions when the Russians kept them on the defensive, but attachés saw very little of the front-line actions, limiting their observations. Logistical concerns also plagued the decision on how to operate machine guns on a modern battlefield. The large expenditure of ammunition demanded constant logistical support. During the Russo-Japanese War, an eight-gun battery expended 6,000 rounds in 90 seconds.[103] These issues compounded, and as David Armstrong argues, "Failure to ask the right questions robbed the attaché reports of much of their usefulness in the area of machine guns."[104]

In the years between adopting the Vickers Sons & Maxim Machine Guns and the First World War, the U.S. continued to purchase new machine guns but did not change its doctrine. The 1909 Benet-Mercie machine gun was supposed to replace the Maxims but

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101 Greenwood, "The U.S. Army Military Observers with the Japanese Army during the Russo-Japanese War (1904-1905)," 7.

102 War Department, *Reports of the Military Observers Attached to The Armies in Manchuria During the Russo-Japanese War, Part III. Report of Major Joseph E. Kuhn, Corps of Engineers* (Washington: Government Printing Office, 1906), 108.

103 Brent L. Sterling, *Others People's Wars: The US Military and The Challenge of Learning From Foreign Conflicts* (Washington D.C.: Georgetown University Press, 2021), 70.

104 Armstrong, *Bullets and Bureaucrats*, 140.

also had significant problems when fielded by the army, although it was adopted as a light automatic machine gun.[105] The prevailing idea of the machine gun and its usage remained as a form of light artillery supporting the infantry. Lt. Parker continued trying to change U.S. Army doctrine to one that linked the machine guns to the infantry instead of the artillery. President Roosevelt supported Parker's ideas, ordering additional machine guns and directing the War Department to change the organization of machine guns. Instead, the War Department authorized in 1909 a new manual for machine-gun platoons, which didn't include information on lessons from the Spanish-American War or the Russo-Japanese War.[106] The new manual was one of the last documents created for the U.S. Army regarding the operations and tactics of machine guns in war. Prior to World War I, the U.S. Army adopted some of the most forward-thinking designs. Though it did not react to the Spanish-American War and others' observations in regards to the mass adoption of the machine gun. Which ultimately, caused more problems as the U.S. produced for and entered the First World War.

The Spanish-American War lasted less than a year, leaving the United States victorious. During the war, more men died from sickness and disease than in combat, but the U.S. had gained the territories of Puerto Rico and the Philippines.[107] When it entered the war, the United States had adopted and produced the Krag-Jorgensen Rifle for nearly six years. There were multiple lessons the United States Army and Ordnance Department learned from the conflict and others that were ignored when it came to small arms. Springfield Armory had not produced enough Krag rifles, and with the influx of

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105 Armstrong, *Bullets and Bureaucrats*, 184.
106 Armstrong, *Bullets and Bureaucrats*, 165.
107 Ivan Musicant, *Empire by Default,* 645.

volunteers, the obsolete Trapdoors had to come out of storage. Although the Krag had roughly been equivalent to other European designs, the Mauser's ability to load from quick-loading devices gave them more firepower than the Krag could produce. In response to these shortcomings, the Ordnance Department adopted a Mauser pattern rifle along the designs they had faced during the war. The model 1903 Springfield became the standard issue service rifle for the U.S. Army and put the U.S. Army on the same technological level as other industrialized European nations. Although the Army was able to learn its lessons when it came to rifles, the utilization, production, and organization of machine guns did not change after the war.

During the expedition to Cuba, Lt. John H. Parker was given the command of four Gatling Guns. In addition, the Rough Riders also had two Colt Automatic Guns that were later given to Parker as Theodore Roosevelt believed they were best used under Parker's command. They were used throughout the Cuban campaign, including the Battle of San Juan Hill, as a close support weapon and later the Siege of Santiago. The Gatling and Colt Guns had shown promise in more offensive roles, but they were kept as pieces of light artillery. The U.S. Ordnance Department adopted the Vickers Sons & Maxim as the first proper machine guns but did not change the organization or operations of the machine guns after reports from Parker and others recommended them to be placed in offensive and defensive roles. After the war, the U.S. Army continued to observe foreign wars, such as the Russo-Japanese War, for any lessons on the application or organization of machine guns in war. Although the U.S. Army had adopted a machine gun similar to other European nations, the offensive capabilities observed in the Spanish-American War

never amounted to any significant changes, leading to some difficulties as the United States entered the First World War.

Secretary of War Elihu Root believed that "The preparation of material of war keeping pace with the progress of military science and adapted to the conditions to be anticipated when war shall arise."[108] In the years between the Spanish-American War and the First World War, the United States adopted small arms equivalent to those of the other European powers. Regarding quality standards, the U.S. adopted the 1903 Springfield, based mainly on the German Mauser and a Maxim-derived machine gun, which would see heavy usage during the First World War. Quality was never a significant issue in the Ordnance Department, but quantity was. The U.S. did not have enough Krag rifles to supply all its troops, and the amount of machine guns in U.S. inventory was not tremendous. The U.S. Ordnance Department tried to remedy this situation by opening another production facility at Rock Island Arsenal to increase the production rate. Still, the lack of arms continued to be a significant issue for the U.S. Army. When the First World War broke out in Europe, The U.S.'s industrial base was utilized to supply European war efforts and later transitioned to the American War effort. The lack of small arms led the U.S. to hastily adapt in the final part of the "Revolution in Firepower."

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[108] War Department, *Five Years of the War Department: Following the War with Spain, 1899-1903, As Shown in the Annual Reports of the Secretary of War* (Washington: Government Printing Office, 1904), 61.

Chapter Three: American Supply Problems During the First World War

On May 7, 1917, Representative John Quillin Tilson (R-CT) addressed the U.S. House of Representatives, stating, "We cannot manufacture the Springfield Rifle rapidly enough to serve our purpose."[1] This House discussion came one month after the U.S. entry into the First World War. At the beginning of U.S. participation in the war, the two federally owned arsenals capable of producing small arms, Springfield Armory and Rock Island Arsenal, were not tooled up to produce the number of rifles needed. This was a problem since the U.S. was going to send its expeditionary force to fight on the western front. Privately owned factories, however, had been producing small arms for the Triple Entente since the beginning of hostilities. The primary weapon of the infantryman was the rifle, and in the U.S. case, that was the 1903 Model Springfield Rifle. Rep. Tilson utilized data presented by General William Crozier, Chief of the Ordnance Department, to note that there were 800,000 Springfield rifles in stock.[2] Although this may have seemed a large number of rifles, considering that the U.S. armed services were expanding to take in an estimated two to four million additional soldiers, half to a quarter of its soldiers would not go to war with the standard service rifle.[3] Instead of utilizing the limited numbers of Springfields, the AEF used the British P14 Enfield to fulfill the demand for equipment.

The U.S. government turned to private industry to fill the demand for small arms. One of those private companies was the Winchester Repeating Arms Company. By the

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1 "Congressional Record May 7th, 1917," accessed April 11, 2023. https://www.congress.gov/bound-congressional-record/1917/05/07/55/house-section/article/1899-1939. pg. 1911.

2 "Congressional Record May 7th, 1917", pg. 1913.

3 Richard S. Faulkner, *Pershing's Crusaders: The American Soldier in World War I* (Lawrence, University Press of Kansas, 2017) 8.

twentieth century, Winchester was one of the largest small arms manufacturers in the U.S. This included firearm categories like rifles and machine guns during the First World War. Winchester made many products, but their small arms were the most well-known because of their storied success of producing weapons for the American West. In addition, Winchester had also been working with John Moses Browning, one of the nation's most famous firearms inventors, producing revolutionary firearms like the Model 1897 Shotgun and Model 1895 Lever Action Repeating Rifle.[4] At the beginning of the European conflict many nations were short on lots of equipment.[5] The British government desperately needed rifles, amongst many other shortages, and contracted Winchester to produce small arms for its war effort, which later became production lines for U.S. procurement during the First World War.

One of the production lines that came under review was the British P14 Rifles at the Winchester factory. Another Representative, Joseph Medill McCormick (R-IL), asked in what capacity the P14 could be converted to fire the American service cartridge.[6] The production of the British P14s had stopped at this point, as British production of their Lee Enfield's expanded. Ultimately, the M1917 was the resulting change in production to accommodate the U.S. .30-06 caliber cartridge. Adapting the British P14 to the American M1917 took time, and before the rifles went to the troops, they had to have the stamp of approval from the U.S. Ordnance Department. When the U.S. Ordnance Department was short on rifles and machine guns, they turned to private industry companies like Winchester and Colt to produce the needed war material. The only way that Winchester

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4 Val A. Browning, *John M. Browning Armory (*Ogden, UT: Browning Arms Company, 1965), 9.

5 David G. Herrmann, *The Arming of Europe and the Making of the First World War* (Princeton: Princeton University Press, 1996), 217.

6 "Congressional Record May 7th, 1917," Congress.gov, pg. 1911.

could have produced that vast number of rifles was because of the British production lines set up at Winchester for the British war demand.

The U.S. Ordnance Department and Army during the Spanish-American War and military attaches missions thereafter experienced the devastating effect of machine guns on the battlefield. The Ordnance Department approved the adoption of the Maxim machine gun in 1904, but it was only ordered in small quantities compared to other nations' procurements.[7] The U.S. wasn't the only country with difficulties procuring machine guns at the beginning of the war; the British had similar issues with increased demand for automatic weapons.[8] In 1917 and most of 1918, the U.S. had to rely on its allies to procure machine guns and other arms. What resulted was a mixture of American and foreign designs in the hands of American doughboys. The culmination of the "Revolution in Firepower" also saw the introduction of portable lighter machine guns so that one man could carry an overwhelming amount of firepower. The rifle and machine gun were part of a larger conglomeration of weapons used in the First World War. Still, initially, the U.S. Army experienced multiple difficulties in procuring the necessary arms.

Today, it is easy to assume that the U.S. had enough equipment for any future conflict, yet this wasn't the case in 1917. The U.S. Ordnance Department had been slowing firearms production in the two-state arsenals. This was partially because procurement orders had been largely met, and the state arsenals were mainly tooled to produce replacement parts for rifles in service. To fully equip the U.S. Army with the

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7 William Crozier, *Report of the Chief of Ordnance to the Secretary of War for the Year 1904* (Washington: Government Printing Office, 1904), 114.

8 Richard Fisher, "Provisioning the Requirement: Machine Gun needs of the British Expeditionary force in France, 1914-1916," *Armax: The Journal of Contemporary Arms* IX, no. 2 (Autumn-Winter 2023), 21.

standard service rifle would have taken several years. This final chapter examines the culmination of the "Revolution in Firepower," where the U.S. finally integrated some of the most technologically advanced small arms during the First World War. To find out how the U.S. got into the fight, this chapter asks what procurement problems the U.S. Ordnance Department faced regarding rifles and machine guns and how the Ordnance Department responded to those problems. By answering these questions, I argue that the British contracts were essential to spinning American private companies onto a war footing. Once the U.S. entered the First World War, to satisfy the American demands, the production lines that were once producing for the Europeans turned to fit American needs.[9] Without that initial investment by Britain, Winchester could not have been a massive supplier of weapons to the U.S., and the U.S. would have had even more significant problems in meeting demand. Finally, this chapter will illustrate that by the end of the "Revolution in Firepower," the U.S. Army aimed to have the most advanced small arms in its arsenal.

The initial investment by Britain demonstrated two crucial aspects of war. The first is, especially in modern conflict, the desperate nature of production. Going into the First World War, the warring nations underestimated the amount of ammunition and small arms needed in what became a total war.[10] The British expanded the number of machine guns at the battalion level and had to adapt to the manufacturing logistics by introducing other machine guns, such as the Lewis gun.[11] Production of simple items like

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[9] Paul A.C. Koistinen, *Mobilizing For Modern War: The Political Economy of American Warfare, 1865-1919* (Lawrence: University Press of Kansas, 1997): 129.

[10] Max Boot, *War Made New: Technology, Warfare, and the Course of History* (New York: Gotham Books, 2006), 199.

[11] Fisher, "Provisioning the Requirement", 30.

guns and ammunition is just as necessary to warfare as any recruiting drive. Rifles and machine guns became everyday tools for the soldiers, and the British contracts only fostered the expanding combined arms tactics. The early British contracts with Winchester also show the government and private industry partnership that only grew because of the First World War.

When the British entered the war, they were in a similar situation that the U.S. would find itself in three years later. To supplement their supplies, they looked to American private industry. From there, Winchester's production of the P14 rifle was completed, with 235,293 rifles produced just as the U.S. entered the First World War.[12] The hopes of the U.S. Ordnance Department that a private company like Winchester might produce the American Springfield Rifle were never finalized. Instead, they adopted a version of the P14 after switching machine tools to manufacture the rifle in the American caliber. The M1917 was an American version that utilized the same machinery as the British contract. Although there was no direct connection between Winchester and U.S. Ordnance, the British contracts were one of the most important steps in preparing for American entry into the First World War.

Manufacturing Service Rifles in the Private Sectors

At the onset of the war in 1914, the Winchester Repeating Arms Company had been oriented towards selling to the civilian market. Their main products were mostly sporting arms like shotguns and some of the first self-loading repeating firearms. However, Winchester had the equipment and machinery to mass produce rifles and American service arms in the state arsenals. So, with very few contracts with the U.S. Ordnance

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[12] C&Rsenal, "History of WWI Primer 027: British Pattern 14 Documentary," YouTube Video, 43:12, June 6, 2016, https://www.youtube.com/watch?v=rxPRFQCGSgM&t=173s.

Department, Winchester focused on the civilian and sporting markets. With their high demand, the British contracted Winchester to produce the P14. It was one of the first firearms orders from a state body that later influenced U.S. Ordnance procurement.

At the time of the First World War, The U.S. peacetime army was just under 98,000, which was only 16 percent of the German, 18 percent of the French, and 38 percent of the British peacetime armies.[13] At the start of the war in 1914, American troops were spread throughout American colonial possessions. America was neutral for the first three years of the war, but some international incidences drew it closer to war. One crisis that led to American entrance was Germany's resumed unrestricted submarine warfare. U.S. President Woodrow Wilson believed the "freedom of the Seas" was essential to all nations.[14] The unrestricted submarine warfare compromised that freedom and events like the sinking of the Lusitania were categorized as a "villainous blow" against the U.S.[15] In addition to unrestricted submarine warfare, the Zimmerman telegram also caused diplomatic strife between the U.S. and Germany. The German telegram was sent to Mexico in a bid to have it attack the U.S. if the U.S. were to join. In return for attacking the U.S., Mexico would receive Texas, Arizona, and New Mexico.[16] The Zimmerman telegram, intercepted and decoded in Paris, was published in American newspapers, and in combination with unrestricted submarine warfare, these were viewed

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[13] Edward M. Coffman, *The Regulars: The American Army, 1898-1941* (Cambridge, Harvard University Press, 2004), 203.

[14] Heinrich August Winkler, *The Age of Catastrophe: A History of the West, 1914-1945* (New Haven: Yale University Press, 2015), 28.

[15] Daniel M. Smith, *American Intervention, 1917: Sentiment, Self-Interest, or Ideals* (Boston: Houghton Mifflin Company, 1966), 107.

[16] Justus D. Doenecke, *Nothing Less Than War: A New History of America's Entry into World War I* (Lexington, KY: The University Press of Kentucky, 2011), 263.

as overt acts of German aggression.[17] Eventually, with pressure mounting, the U.S. joined the war, drastically affecting the size and armament of the U.S. Army.

As the United States entered the war, there was a huge demand for manpower in the armed forces. Starting from about 200,000 soldiers (including National Guardsmen) before the war, but on April 6, 1917, the U.S. passed the Selective Service Act, recruiting over 1,500,000 regulars and draftees, and by war's end, the Army swelled to 4,000,000.[18] Although there was a large influx of around 700,000 volunteers at the onset of the war, by November 1918, seventy-two percent of the army was conscripted.[19] The drastic increase in the army's size quickly meant that the state armories were cleared out. The Ordnance Department realized that as they joined the war, they had inadequate numbers of rifles and machine guns.[20] To eventually meet the small arms demand of the war, the state arsenals expanded their production lines, but not quickly enough. Instead, a viable option to meet the wartime demand was to contract private companies to produce a service weapon that could supplement the standard M1903 Springfield. To supplement their stocks of M1903, the U.S. Ordnance Department looked to American plants producing British rifles.

Although the United States had not declared war in 1914, the American arms companies were contracted to fulfill others' wartime demands. Winchester Bennet, the president of the Winchester Repeating Arms Company, was open to producing weapons for Great Britain. A couple of months after the First World War started, Bennet wrote

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17 F. Lee Benns and Mary Elisabeth Seldon, *Europe 1914-1939* (New York, Meredith Publishing Company: 1965), 66.

18 Coffman, *The Regulars*, 205.

19 Jennifer D. Keene, *Doughboys, The Great War, and The Remaking of America* (Baltimore: The Johns Hopkins University Press, 2001), 9.

20 Benjamin Franklin Cooling, *Arming America Through the Centuries: War, Business, and Building a National Security State* (Knoxville, The University of Tennessee Press: 2022), 114.

that he thought it "difficult to maintain in person the neutrality which our national position demands and one is inclined to feel from all one sees and hears that the neutrality is of the nation and the federal government only for certainly much sympathy [For Great Britain] is evident."[21] Winchester and the British government had to decide what firearm to produce in the New Haven factory. Right before the Great War broke out, the British government sought to produce a new firearm to replace their Short Magazine Lee-Enfield No. 1 Mk III (SMLE No. 1 Mk III). The rifle that was in development was the Pattern P14 Enfield (P14).

The P14 had been in the design stages for several years in Great Britain. The British decided to produce an entirely new rifle designed after the British experiences during the Boer Wars.[22] Production of the P14 would start right before the outbreak of the First World War, but the war made it difficult to switch mid-conflict, so the British contacted Winchester to produce the P14 in the British .303 cartridge. On November 24, 1914, the British government and the Winchester Repeating Arms Company signed a contract that allowed Winchester to produce the P14 rifle. The original contract was for Winchester to produce 200,000 P14 rifles by May 31, 1916.[23] With each rifle costing $32.50, the contract was also left open to expand production beyond the original 200,000 on order.[24] A few weeks before the contract was signed, Winchester tooled up to produce

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[21] Harold F. Williamson, *Winchester: The Gun that Won the West* (New York: A.S. Barnes and Company, Inc, 1963), 218.

[22] Bruce N. Canfield, *U.S Infantry Weapons of the First World War* (Lincoln, RI: Andrew Mowbray Publications, 2000), 76.

[23] Winchester Repeating Arms Company Archives Collection, *MS 20.02.01 Contract Between Winchester Repeating Arms Company and Sir Courtenay W. Bennett*, McCracken Research Library, Buffalo Bill Center of the West. accessed April 11, 2023. 2.http://library.centerofthewest.org/digital/collection/p17097coll30/id/4156/rec/46

[24] *MS 20.02.01 Contract Between Winchester Repeating Arms Company and Sir Courtenay W. Bennett*, McCracken Research Library, 1.

the P14. That tooling process included procuring more extensive facilities, thousands of measurement gauges, and production changes.

To produce the P14 in such large quantities, Winchester had to expand its factories for a new production line. Enlarging the New Haven, Connecticut plant took time and money. The infusion of funds from the British contract allowed Winchester to construct a whole new production line. Under the payment subsection, the British government put up twenty-five percent of the contract price "for such plant expansion of the manufacturer as the said manufacturer may deem necessary and proper."[25] Although the twenty-five percent did not cover the total expansion, the British funds helped to establish the production line. An essential part of mass production and the "American System of Manufacturing" is producing interchangeable parts and inspecting gauges and specialty machinery.[26] Although most parts on small arms are interchangeable, completing them correctly took some hand fitting, so not every rifle could be considered interchangeable. If one was assembled with non-matching or incorrect parts, it could cause a catastrophic failure, injuring or killing the shooter. The primary way to examine specific measurements to ensure the rifles were safe was through standard gauges.

Gauges are measurement tools built to very tight tolerances to produce a working part consistently. The inspection of the P14 rifles had to conform to standard gauges and dimensions shown in the drawings.[27] The use of standard gauges, however, did not ensure

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25 *MS 20.02.01 Contract Between Winchester Repeating Arms Company and Sir Courtenay W. Bennett*, McCracken Research Library, 2.

26 David A. Hounshell, *From the American System to Mass Production 1800-1932: The Development of Manufacturing Technology in the United States* (Baltimore: The Johns Hopkins University Press, 1984), 64.

27 George E. Hudson, Specification No. S.A/378. Rifle, Magazine, Enfield .303-inch, Pattern 1914. Specification to Govern Manufacture and Inspection, McCracken Research Library, Buffalo Bill Center of the West , accessed April 11, 2023, 1. http://library.centerofthewest.org/digital/collection/p17097coll30/id/4156/rec/46

a smooth production flow, and the British inspectors and Winchester had made a few changes to the P14 but completed the modifications during the war. The P14 production line was not in place immediately and took months to be operational to work on all modifications fully. Their sorting out of the modifications during the British contract allowed the U.S. to step in and get a more well-adapted rifle later.

One portion that needed fine-tuning was the bolt and body of the P14 rifle. Machined to very tight tolerances, the bolt on a firearm is the locking mechanism of the rifle. For the P14, the British and Winchester went back and forth in designing the bolt and its manufacture. A few years into the production of the P14, Frank Burton, an engineer at Winchester, received a modification to the bolt dimensions and body of the rifle.[28] Both modifications came from Captain Smyth Pigott, part of the inspection staff sent to Winchester from the British Army Ordnance. The already-produced rifles did not receive any new modifications and were not modified afterward, but the newly-produced ones did. The production of the P14 expanded, and the total number of P14 rifles that Winchester produced ended up being 235,528.[29] The production of the British P14 ended in late 1916 and was set up for additional orders, but British SMLE production had increased enough to meet wartime demands. The production line stopped at Winchester but soon spun up again as the U.S. entered the war.

As Representative Tilson spoke in front of the House of Representatives, the P14 had become a viable alternative to U.S. Army Ordnance demands. The initial thought, however, was to have some private companies like Winchester produce the M1903

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[28] G. Wiggins to Mr. Burton, 25 October, 1915, in *World War I, Contracts and Specifications: Letter about Dimensions related to Bolt Stop*, McCracken Research Library, 1. accessed April 11, 2023, http://library.centerofthewest.org/digital/collection/p17097coll30/id/4156/rec/46

[29] Harold F. Williamson, *Winchester: The Gun that Won the West*. 230.

Springfield. Six months before the U.S. entered the war, General William Crozier, Chief of Ordnance, hoped that he could arrange to have "at least one reliable arms company to manufacture one order of Springfield rifles."[30] To have at least one private company producing was a way to boost production of the Springfield that had been slowing during the years before the U.S. entered the Great War. Although there may have been some profit in producing a batch of Springfields, Gen. Crozier and Ordnance thought, "The first order must be built largely for love."[31] That being the love of country and not of profit. Springfield rifles' main production would still occur at the federal arsenals, leaving only small orders for anyone contracted. With such a large overhead cost of setting up production, the small orders wouldn't make any venture profitable. Still, the possibility of producing the Springfield rifle intrigued Winchester, and they requested some information about a contract and production methods of the Springfield.

In preparation for a possible contract to produce the Springfield, Winchester requested drawings and specifications to produce around 15,000 rifles.[32] Setting up production was not easy, and it took time to manufacture the gauges and jigs used in the factories. Rep. Tilson pointed out that the production of specialty tools and jigs was critical to the production of Springfields. In a House of Representatives hearing, Rep. Homer Snyder (R-NY) noted that it took 1,400 tools to manufacture the Springfield rifle.[33] Although the prospect of a contract to produce the Springfield seemed promising

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30 Ordnance Department, *Instructions to Bidders and Governing the Manufacture and inspection of United States Rifle, Caliber .30 Model of 1903* (Washington, Government Printing Press, 1916), 2.

31 Ordnance Department, *Instructions to Bidders and Governing the Manufacture and inspection of United States Rifle,* 2.

32 Ordnance Department, *Instructions to Bidders and Governing the Manufacture and inspection of United States Rifle, Caliber .30 Model of 1903*, 4.

33 "Congressional Record May 7th, 1917," Congress.gov, pg. 1916

to private industry, Ordnance reversed course on having private industry manufacture the Springfield.

In the years leading up to the war, the production of Springfield rifles had dropped. In 1913, the state arsenals had produced over 38,000 Springfields; in 1915, it was under 26,000. Production decreased as the 800,000 rifles produced filled the arsenals and equipped the entire army. Although production had slowed in the federal arsenals, initial hopes inside Winchester were that they would have a possible contract to produce the Springfield. As U.S. intervention was even closer in February 1917, the U.S. Ordnance Department issued a call for a contract for fifteen thousand Springfield rifles.[34] In addition to the rifles produced at Springfield Armory and Rock Island Arsenal, Winchester would become a subcontractor for the M1903s. Although there were not many rifles, Winchester executives believed that if they had obtained an order for the M1903, they would be permitted to sell the rifle to others and ramp up the numbers.[35] Although no manufacturer got a contract, Winchester looked at M1903 Springfield production and how it could be altered to suit their interests.

The production of the M1903 Springfield Rifle was closely linked to its developer and manufacturer, Springfield Armory. Ordnance had Springfield work with Winchester on the proper placement of gauges and tolerances. Springfield Armory had concerns over the time and cost of manufacturing new working gauges for the rifle.[36] Winchester

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[34] Colonel, Ord. Dept. E.B. Babbitt to Winchester Repeating Arms Co., New Haven, Connecticut, in *Model 03 Springfield,* McCracken Research Library, 1. accessed April 11, 2023, http://library.centerofthewest.org/digital/collection/p17097coll30/id/6296/rec/145

[35] Henry Brewer to Chief of Ordnance William Crozier, 17 February, 1917, in *Model 03 Springfield,* McCracken Research Library, 35. accessed April 11, 2023, http://library.centerofthewest.org/digital/collection/p17097coll30/id/6296/rec/145

[36] Col. Ord. Dept. William Peirce to Winchester Repeating Arms Co. New Haven Conn., 21 March, 1917 In *Model 03 Springfield,* McCracken Research Library, 60. accessed April 11, 2023, http://library.centerofthewest.org/digital/collection/p17097coll30/id/6296/rec/145

responded to these concerns by having their armory representative work with Springfield Armory officers.[37] The Winchester and U.S. Ordnance partnership's back-and-forth nature worked to perfect manufacturing, and the small issues of procuring gauges and jigs were important to the future large-scale production. Throughout conversations between Springfield Armory, Winchester, and the U.S. Ordnance Department, the problem of manufacturing gauges and sending worn-out versions was one of the reasons why private manufacturing of the M1903 did not occur. Another reason Winchester and other companies were not given large contracts to produce the government rifle was because Ordnance thought the federal arsenals could ramp up production enough to supply American troops in the coming years. Estimates of production were that in the summer of 1917, the federal arsenals could produce close to half a million rifles in one year, if working three shifts, year-round.[38] This would roughly be the pass throughout the entire war, even as war plans stretched in 1919.[39]

It would take over two years to produce M1903s in private plants to reach the production rate at Springfield and Rock Island. The major bottleneck was being able to provide the proper tools and gauges for the new production line. An extract from Army and Navy journals from November 1918 stated Springfield Armory was able to produce one thousand rifles a day a year earlier.[40] In addition, Congress had also hamstrung the U.S. Army by updating the Militia Act of 1903 by only allowing government offices to

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[37] Henry Brewer to Commanding Officer at Springfield Armory, 23 Mach, 1917, in *Model 03 Springfield,* McCracken Research Library, 66. accessed April 11, 2023, http://library.centerofthewest.org/digital/collection/p17097coll30/id/6296/rec/145

[38] "Congressional Record May 7th, 1917," 1910.

[39] Allan R. Millett, Peter Maslowski, and William B. Feis, *For the Common Defense: A Military History of the United States from 1607 to 2012* (New York: Free Press, 2012), 407.

[40] B.E. Holmes "Small Arms Production," *Army and Navy Journal*, 2 November, 1918. accessed April 11, 2022, 122. http://library.centerofthewest.org/digital/collection/p17097coll30/id/6296/rec/145

produce the U.S.'s weapons and munitions.[41] This was done to standardize the equipment in both the U.S. Army and the newly formed National Guard. Although private manufacturing of the Springfield did not happen, the production of Springfield rifles did increase as the war went on, and it seemed that by 1919, federal arsenals would be able to produce enough rifles. The U.S. Ordnance Department estimates for 1919 were optimistic, but the U.S. Army still needed a rifle beside the Springfield. As production of the Springfield in private companies waivered, the idle production line set by the British was a promising replacement that had already gone through multiple modifications and total production, so it became of great interest to the U.S. Ordnance Department.

A speech from Rep. Tilson during the war illustrated the U.S. problem quite clearly. Speaking at a House of Representatives hearing, he noted "that it would take two years to make the jigs, dies, gauges, templets, tools, and various kinds of fixtures to fasten these different tools on the machine to make a rifle."[42] Having close connections to Winchester as there district representative, Tilson estimated this time scale from the British experience and how long it took them to tool up production of the SMLE rifle. A possible solution to the lack of small arms was purchasing firearms from private industries. According to Rep. Tilson, it would take two years to get one production line fully up and running, so starting a new line was out of the question. Instead, the U.S. Ordnance Department looked for rifles already in production, and the one they found was the Winchester contracted P14.

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41 Benjamin Franklin Cooling, *Arming America Through the Centuries*, 118.

42 Washington. *National Defense. Torpedoes. Rifles, and Machine Guns: Speech of Hon. John Q. Tilson of Connecticut in the House of Representatives*, 26 March, 1918, 8.

Years after the First World War, famous manufacturing engineer Edwin Pugsley illustrated the possibilities of the P14 production line. He recorded that

> At the end of 1916 and the early months of 1917, we had either completed or had canceled practically all the work we had for foreign governments … so that the first part of 1917 found us with a plant entirely equipped for making small arms and ammunition and an organization thoroughly trained and nothing to do. Great portions [of the plant] were idle.[43]

An entire factory that had all the tooling and equipment to produce thousands of rifles a day was what the U.S. Ordnance Department was looking for. With the high demand for small arms, Ordnance looked at changing and adapting the P14 production line to fit their needs. The almost idle production line brought Winchester and U.S. Ordnance into a closer procurement relationship. But for Ordnance to accept the P14, some manufacturing changes had to occur.

Although the Springfield Rifle had been the standard issue rifle for the U.S. Army since 1903, in storage, more obsolete rifles were pulled out as training rifles. The American-made 1898 Krag-Jorgenson, manufactured in the federal arsenals, was obsolete for front-line service. On the other hand, the U.S. Ordnance reported that it had 350,000 Krag-Jorgenson rifles, which shot a caliber that the U.S. arsenals were no longer producing, so they were deemed unsuitable for combat.[44] To meet demand the U.S. Army Ordnance turned to private industry for newer small arms.

Switching the P14 to shoot the America .30 caliber was one of the first changes requested by the Ordnance Department. Although altering a rifle to fire another caliber may seem simple, it takes time and money. As the British contracts had been settled months prior, there was time to retool the Winchester production lines to adapt to the

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43 Harold F. Williamson, *Winchester: The Gun that Won the West*. 236.

44 "Congressional Record May 7th, 1917," pg. 1913.

American cartridge. On April 3, 1917, Henry Bennet explained to General Crozier that "we [Winchester] have a potential capacity of about six hundred thousand rifles in the time mentioned [in one year]," but Bennet discouraged an order of that magnitude because of wear to machinery and less time for inspection of quality. [45] There is very little mention of end production how many rifles were produced, but once mass production started it would not stop until mid-1919, with over two million built, between Remington, Eddystone, and Winchester.[46]

Instead, Bennet recommended ramping up production slowly. Within sixty days of production, the new machinery could produce one thousand P14 rifles daily. Eventually, within six months of signing the contract, Winchester produced and delivered 2,000 converted P14s daily to the U.S. Ordnance Department.[47] By April 4, 1917, Winchester and other companies manufacturing the P14 agreed to a system of limited interchangeability of parts on the rifle.[48] Although no orders had yet come from the U.S. Ordnance Department, Winchester, Remington, and Eddystone were preparing for large orders of the modified P14.

One month after the U.S. entered the war, Springfield Armory was responsible for testing the sample P14 rifles. The tests included durability examinations, similar to the previous procurement of standard-issue rifles. British inspectors and other personnel had done much of the testing of the P14's capabilities during the early parts of the war. The main test for sample P14 rifles was to see if they could handle the American .30 caliber

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45 Henry Bennet to Chief of Ordnance General William Crozier, 3 April, 1917, in *Letters & Memos Relative to Winchester Producing Enfield for U.S. Army*, McCracken Research Library, accessed April 11, 2023, 2. http://library.centerofthewest.org/digital/collection/p17097coll30/id/5893/rec/95

46 Bruce N. Canfield, "The U.S. Model of 1917 Rifle" *American Rifleman,* accessed March 11, 2024, https://www.americanrifleman.org/content/the-u-s-model-of-1917-rifle/

47 Henry Bennet to Chief of Ordnance General William Crozer, 3 April, 1917, 3.

48 Harold F. Williamson, *Winchester: The Gun that Won the West*. 237.

cartridge. According to the very chauvinistic test results, the sample rifles were not considered as good as the Springfield but were equal or superior to any of the other belligerent nations' rifles.[49] The testing went according to plan, and on May 11, 1917, the U.S. Ordnance Department accepted the model and asked Winchester and others to begin large-scale production. The first order of 225,000 came directly from the Secretary of War for what was now called the Model of 1917 Enfield (M1917).[50] During the U.S.'s participation in the war, more orders were sent to private manufacturers.

Within the time of U.S. Ordnance's acceptance of the M1917 and the first order being delivered, Winchester had already started to produce the M1917 in large quantities, taking on the risk of having no contract. By December 1917, Winchester had produced over 80,000 rifles. Compared to the other manufacturers of the M1917, Winchester, with the month's head start, produced roughly the same amount as companies dedicated to just producing the 100,000 M1917s. To fully sort out the production of the M1917 rifle, the U.S. Ordnance Department and Winchester signed a contract on how to fund Winchesters' production. The Cost-Plus-Ten-Percent Contracts became synonymous with private manufacturing for the U.S. government moving forward.

Unlike General Crozier's hope for private companies to produce the Springfield for the love of one's country, Winchester needed to produce the M1917 at a profit. The Cost-Plus-Ten-Percent contracts were straightforward in that the value of the product was cost-plus-ten percent. For example, if one three-inch artillery shell cost Winchester ten dollars to make, then U.S. Ordnance would purchase that shell for eleven dollars. A contract for the three-inch shrapnel shells from Winchester demonstrated the overarching

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49 Williamson, *Winchester*, 238.
50 Williamson, *Winchester,* 238.

goal of producing military equipment quickly, and a portion of the money was to be paid upfront. When completed, the rest would be paid.[51] There is little information that presents the exact prices for the M1917 rifles. In a later hearing about the cost of the M1917, estimates were that the U.S. government paid $26 for each rifle (about $665 today).[52] In addition to the cost of the rifles, the U.S. government also partially funded and was responsible for some of the machinery at Winchester.

American soldiers in the First World War had mixed reviews of the rifle. The additional magazine capacity in the rifle was appreciated. A good example was when Corporal Alvin York arrived in France and had to give up his American guns (M1917):

> So we got to France at Le Havre. There, we turned in our guns and got British guns (Lee Enfield). Well, we went out from Le Havre to a little inland camp. I had taken a liking to my gun by this time. I had taken it apart and cleaned it enough to learn every piece, and I could almost put it back together with my eyes shut. I was the only mountaineer in the platoon. I didn't like the British guns so well. I don't think they were as accurate as our American rifles.[53]

The Lee Enfield was often called the "British gun," and in this case, Corporal York complained about the accuracy problems. Upon arrival to Europe, many of the infantry divisions within the AEF were forced to hand over their M1917s. Instead, they were trained with allied equipment such as the Lee Enfield and later issued their own M1917s. The American soldiers preferred the American rifle, but the Springfield could not be provided in large quantities, so the "British guns" had to serve the role of a front-line rifle. The reason for the exchange of guns was for the American rifles to be held until

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51 Washington. *Cost Plus Fixed Profit Contract (Number) Complete Rounds 3-inch Shrapne*l, Government Printing Office, June 1917, 7.

52 Harold F. Williamson, *Winchester: The Gun that Won the West*. 241.

53 *Diary of Sergeant Alvin York,* June 1917- May 1919/ May 21st, 1918, The Diary of Alvin York. accessed April 20, 2023, https://acacia.pairsite.com/Acacia.Vignettes/The.Diary.of.Alvin.York.html#The%20Diary

battle, and since the training camps were run by The British and French, it was easier to supply with allied equipment. The M1917 was one of the rifles used by American Doughboys throughout the war, and almost a third of them were manufactured and marked by the Winchester Repeating Arms Company.

The British contracts with Winchester proved crucial to producing rifles for U.S. involvement in the First World War. Although the British P14 was not a front-line rifle as it was not well appreciated by the British forces and was used to free up the standard Lee Enfield, the American M1917 was issued to troops on the front lines.[54] At the war's end, the total production of M1917 rifles at Winchester was almost 550,000 rifles.[55] Compared to the Springfield rifles produced during American involvement in WWI, with a little over 150,000 produced in the same time, more Americans were armed with the M1917 than the M1903.[56] As previously stated, the Winchester Repeating Arms Company was not the only company producing the M1917, but they could produce vast amounts of rifles desperately needed by the U.S. Ordnance Department. With the U.S. government's and Ordnance's close involvement, the production and conversion of P14 rifles to M1917 were closely controlled and manufactured by Winchester.

Foreign Machine Guns in American Service

Although rifles were still the predominant small arms on the battlefield during the First World War, another form of small arms technology was also involved in the fighting. That small arm was the machine gun. Combined with rifles, this was one of the earliest

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54 C&Rsenal, "History of WWI Primer 027"

55 F.E. Nolan to A.M. Batchelder, 24 January, 1919, in *World War I List of Government Contracts & Orders*. McCracken Research Library. accessed April 11, 2023, 16. http://library.centerofthewest.org/digital/collection/p17097coll30/id/6272/rec/27

56 Lt. Col. William S. Brophy, *The Springfield 1903 Rifles: The Illustrated, Documented Story of Design, Development, and Production of all the Models, appendages, and Accessories* (Guilford, CN: Stackpole Books, 1985), 425.

forms of combined small-arms tactics. Small arms tactics came into play with diversifying soldiers' primary weapons. Using machine guns to pin down enemies while riflemen moved up to a position became very important during the First World War. To support others in accomplishing a specific task, people push assets and technology into different roles. Although large-scale warfare is where combined arms primarily come into play, and we think of tanks, air assets, artillery, and it can also apply to infantry small arms.

Machine guns in the years leading up to the First World War were primarily heavy and tripod-mounted, which were difficult to move in positions and were serviced by six man crews.[57] The model 1904 Maxim adopted by the U.S., was designed to be placed into a fixed position and used on the defensive or utilized as light artillery. The desire for increased firepower on the offensive changed the development of machine guns. Instead of having heavy defense machine guns, many European armies investigated lighter patterns of machine guns that could go over the top and support them as they advanced. Lighter machine guns were not a new concept during the First World War. Some commercially successful models were known as "Automatic Rifles," such as the Danish Madsen or the American Lewis Gun.[58] Almost all the great powers of the First World War had adopted a version of the light machine gun by the war's end, some more effective than others, and they had become an integral part of small unit tactics. The U.S. Army, like so many others, adopted a light machine gun of its own similar to the P14 rifle; the United States looked to adopt a foreign-designed and produced machine gun

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[57] David Stevenson, *Cataclysm: The First World War as Political Tragedy* (New York: Basic Books, 2004), 216.

[58] Canfield, *U.S Infantry Weapons of the First World War*, 145.

when it entered the war. When the U.S. entered the war, the demand for machine guns was so high that the Ordnance Department adopted previous models that were noted as not as efficient.[59]

The model 1904 Maxim was the standard machine gun of the U.S. Army. Once it entered the First World War, the U.S. had very few machine guns compared to its European counterparts.[60] By the middle of 1916, the British had procured over 140,000 machine guns, enough to supply their troops and reserve some for training, so when the first Americans arrived to be trained in trench warfare, they were immediately trained in using machine guns.[61] The British and the French trained American Doughboys in camps separate from the front and provided invaluable training on different models and types of machine guns.[62] One machine gun that was utilized in large quantities was the French Chauchat light machine. The Chauchat is largely regarded as one of the worst machine guns ever made, primarily due to its awkward operating mechanism and susceptibility to mud and debris.[63] However, the one redeeming factor of the Chauchat was that it was easily mass-produced and could equip the American force that lacked such mobile firepower. Once the AEF arrived in Europe, they began training on the Chauchat and other trench warfare devices.[64] In training, the U.S. had adopted and converted some of

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59 William Crozier, *Report of the Chief of Ordnance to the Secretary of War for the Year 1917* (Washington: Government Printing Office, 1918), 813.

60 Tom Laemlein, "Machine Guns of The American Expeditionary Force in World War I," *American Rifleman*, accessed February 25, 2024, https://www.americanrifleman.org/content/machine-guns-of-the-american-expeditionary-force-in-world-war-i/

61 Fisher, "Provisioning the Requirement", 36.

62 General John J. Pershing to The Chief of Staff A.E.F, March 10, 1918 in *United States Army in the World War 1917-1919: Training and Use of American Unites with the British and French* (Washington: Center of Military History United States Army, 1989), 69.

63 Chuck Oldham, "The Five Worst Light Machine Guns (LMGs)," *DefenseMediaNetwork*, accessed February 25, 2024, https://www.defensemedianetwork.com/stories/the-five-worst-light-machine-guns-lmg/5/

64 Mitchell A. Yockelson, *Borrowed Soldiers: Americans Under British Command, 1918* (Norman: University of Oklahoma Press, 2016), 28.

their Chauchats to fire the American 30-06 cartridge. Still, due to manufacturing problems, the AEF utilized the Chauchat in the French 8mm Lebel cartridge. Even with the introduction of Chauchat into the AEF, the demand for machine guns outstripped the supply, and other machine guns had to be procured, primarily from the French and British.

The American forces were trained on the French versions of the Benét–Mercié. Already in service with the Americans in the form of the Model 1909, there wasn't a large need to drastically change procurement. Lieutenant Colonel John Parker, still advocating for the widespread adoption of machine guns, toured a French automatic weapons center and submitted a report stating that the rifleman's days were over, and the bayonet was becoming as obsolete as the crossbow.[65] For Parker, the First World War showed the destruction and capabilities of the machine gun, and there were multiple designs in use amongst America's allies. The AEF adopted the heavier version of the Benét–Mercié called the Hotchkiss 1914 and primarily used it in fixed positions, similar to the French. Feeding from long ammunition trays, the Hotchkiss provided a continuous stream of fire similar to the 1904 Maxim; the distinction is that the Maxim used a water-cooling jacket, and the Hotchkiss used a thicker barrel to dissipate the heat from firing.[66] The Hotchkiss machine gun became the primary heavy machine gun the AEF used throughout the war as the Americans entered the front lines in France.[67] Although it was

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[65] Andrew Wiest, "Preferring to Learn From Experience: The American Expeditionary Force in 1917," in *1917: Tactics, Training and Technology,* edited by Peter Dennis and Jeffrey Grey (Canberra, Australia: Australian History Military Publications, 2007), 145.

[66] William Crozier, *Handbook of the Hotchkiss Machine Gun Model of 1914*, (Washington, Government Printing Office, 1918), 7.

[67] Tom Laemlein, "The Hotchkiss Model of 1914 Heavy Machine Gun," *American Rifleman*, accessed February 27, 2024, https://www.americanrifleman.org/content/the-hotchkiss-model-of-1914-heavy-machine-gun/

the primary foreign machine gun in the American lines, it wasn't the only one; the AEF also utilized British equipment until American material could arrive in Autumn of 1918.

In practical terms, the Vickers is a derivative of the Maxim gun with a few design changes. Both are water-cooled heavy machine guns meant to be fixed into positions and provide sustained intense fire. The Vickers had already been one of the primary machine guns of the British army and had been tested by the U.S. Ordnance Department in 1913, which strongly recommended the adoption of the Vickers gun over the Benét–Mercié.[68] Though the recommendation was made, the war breaking out in 1914 lessened the chances for American adoption, as production of the Vickers was in Britain, and their production lines were being used to meet British demands. When the U.S. entered, they could supplement the stocks of Maxim machine guns for the British and American Vickers. However, the Vickers was a stopgap until the American production of the M1917 Browning could be ramped up. In addition to the Vickers, the U.S. also carried into battle another light machine gun they had previously discounted, the Lewis gun.

The Lewis Gun was designed by an American Army officer, Isaac Newton Lewis, in 1911.[69] Although initially designed in the United States, the Ordnance Department did not adopt the Lewis Gun as they deemed it inferior to both the Vickers and Benét–Mercié but did note that the British Army had been utilizing them extensively in the war.[70] Like other light machine guns, the Lewis benefited from only having a two-man crew and light enough to carry on the offensive. Progressively, throughout the war, the number of Lewis

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[68] David A. Armstrong, *Bullets and Bureaucrats: The Machine Gun and the United States Army, 1861-1916* (Westport, CT: Greenwood Press, 1982), 185.

[69] Bruce N. Canfield, "The American Lewis Gun," *American Rifleman*, , accessed March 1, 2024, https://www.americanrifleman.org/content/the-american-lewis-gun/

[70] William Crozier, *Report of the Chief of Ordnance to the Secretary of War for the Year 1916* (Washington: Government Printing Office, 1916), 24.

guns within a British army battalion increased from eight to thirty-six, demonstrating the need for expanded production capacity for such weapons.[71] Due to the high demand for machine guns, when the AEF arrived in Europe, it was equipped with the Lewis Gun already in service and added the Benét–Mercié, Vickers, Maxim, and Chauchat guns that it could acquire in short order. The adoption of these foreign designs was only supposed to hold the army over until the arrival of American machine guns, including the M1917 Browning Heavy Machine Gun and the Browning Automatic Rifle (BAR).

The high demand of the war led to the U.S. Ordnance Department testing and adopting a multitude of machine guns, and America's most famous firearms designer, John Moses Browning, had a few designs ready by 1917. In 1910, Browning had designed a water-cooled belt-fed machine gun similar to the Maxim and Vickers. This design was tested in 1917 at the Government Proving Grounds at Springfield Armory.[72] The main test was an endurance test of twenty thousand rounds in which the Browning gun fired without malfunction and fired another twenty thousand rounds, totaling forty thousand rounds continuously.[73] The final decision was to adopt the machine gun as the model of 1917, but there was no production line manufacturing the gun, so Browning turned to Colt to produce the machine gun. Production of the Browning M1917 was slow and it wouldn't be issued out or see proper combat until September 1918, but it replaced

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71 Tony Ashworth, *Trench Warfare 1914-1918: The Live and Let Live System*, (London: MacMillan Press, 1980), 61.

72 Robert G. Segel, "The Browning Model 1917 Water-Cooled Machine Gun," Small Arms Defense Journal, accessed March 2, 2024, https://sadefensejournal.com/the-browning-model-1917-water-cooled-machine-gun/

73 Forgotten Weapons, "Browning M1917: America's World War One Heavy Machine Gun," YouTube Video, 15:57, March 14, 2018, https://www.youtube.com/watch?v=94jDwOBjV-w

the Maxim and Vickers heavy machine guns after the war.[74] Browning also designed an automatic rifle that was highly anticipated during the war.

The BAR had principles similar to the French Chauchat and the British Lewis Gun. It was lightweight and provided automatic firepower on the offensive. The BAR was about two pounds lighter and had double the rate of fire, in addition to its overall reliability compared to the Chauchat. During the testing of the Browning heavy machine gun in 1917, the BAR was also tested and approved for adoption immediately.[75] The production of the BAR was subcontracted to Colt and had the support of the members of Congress and the Secretary of War, who believed that it was the most effective gun of their type.[76] Although the BAR was adopted, the production of the automatic rifle was slow, and it wouldn't make it to the frontlines until September 1918. Amongst the frontline commanders, there was a certain reluctance to deploy the new automatic rifle due to the risk of it being captured and copied by the enemy.[77] In any case, the BAR was pushed into the final offensives of the war, as did the other machine guns produced or given to the AEF.

The number of different designs and types of machine guns in the U.S. inventory shows how unprepared the U.S. Army was as it joined the war. The prewar numbers of machine guns in inventory were very few compared to the great powers fighting for nearly three years as the U.S. was still primarily focused on possible coastal threats. The AEF was equipped with mostly French machine guns and a few British guns, especially

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74 Faulkner, *Pershing's Crusaders, 221.*

75 George Chinn, *The Machine Gun, Volume I: History, and Development of Manual, Automatic, and Airborne Repeating Weapons,* (Washington D.C.: Bureau of Ordnance, 1951), 176.

76 Chinn, *The Machine Gun, Volume I,* 177.

77 Lt. Col. Edward B. Cummings, "Browning Automatic Rifle" *The Army Historical Foundation,* accessed March 2, 2024, https://armyhistory.org/browning-automatic-rifle/

as the first units arrived in Europe. The machine guns provided to the AEF were to be utilized until the arrival of American machine guns, such as the M1917 and the BAR, which were present in large enough quantities. As American Doughboys entered the trenches, they experienced the horrors of trench warfare but also learned of the firepower provided by the machine gun. Through significant battles, including at Aisne-Marne and Meuse-Argonne in the war's final months, American soldiers experimented with machine guns and other small arms that emerged from the climax of the "Revolution in Firepower."

The French Tenth Army headed off the Aisne-Marne offensive in mid-July to early August 1918 with the help of several American divisions.[78] This defensive stand closed the Marne salient and swung the initiative in favor of the Allies in a continued push of the German Front line to the Vesle River. The major push of the Aisne-Marne counter-offensive had its struggles; in some circumstances, the lack of machine guns made it more difficult. The machine gun company of the 39th U.S. Infantry had been trained on four different machine gun platforms before the offensive, but it wasn't until mid-June that the company was trained on the Hotchkiss machine gun.[79] The problem of being trained on multiple machine guns but then being issued with a different machine gun altogether became a common occurrence on the front lines. At least it allowed for a wealth of knowledge and technological transference amongst the AEF. The machine gun had become an important asset for all Armies, and the AEF was learning this through brutal combat in the trenches.

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78 Department of Military Art and Engineering, *A Short Military History of World War I: With Atlas Part 2,* (West Point: U.S.M.A. A.G Printing Office, 1950), 313.

79 Faulkner, *Pershing's Crusaders, 223.*

The last large-scale offensive of the war on the Allied side was the Meuse-Argonne Offensive, which lasted from September 26 to November 11, 1918. The main objective for the approximately 600,000 Americans was to drive the enemy back from the Sedan-Mezieres Line.[80] The initial two phases of General Pershing's plan were hard-fought, and army staff experienced trouble providing adequate tank and air support. Still, during the later phase, the AEF pushed the Germans six miles beyond the original line. The first batches of American Browning M1917s and BARs were arriving at the front in time for this offensive. The M1917 first saw combat with the 79th Division and performed exceptionally well, with one company firing ten thousand rounds per gun in one day.[81] The BAR was pushed onto the offensive as a force multiplier, but not in large enough numbers to equip the entire American force during the First World War.[82]

Although these are two specific observations on two campaigns during the war, they highlight two wide characteristics of American machine gun usage. At Aisne-Marne and Meuse-Argonne, there were critically low amounts of machine guns in the U.S. inventory because the U.S. had not heavily invested in procuring or tactically developing machine guns in the previous decade. To catch up, the AEF had to adopt the machine guns at hand, mostly provided with foreign designs similar to what had happened with the British P14. As the war progressed, new American designs appeared on the front lines. Even though they were not present in large numbers, compared to other machine guns that had been used for years before, American designs were regarded as the pinnacle of machine guns at the war's end; with these advancements in American adoption and

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80 Department of Military Art and Engineering, *A Short Military History of World War I,* 327.
81 Segel, "The Browning Model 1917 Water-Cooled Machine Gun"
82 Faulkner, *Pershing's Crusaders, 227.*

machine gun designs during First World War, new tactics were developed to use these small arms to there greatest potential.

As previously noted, heavier machine guns such as the Maxim, Vickers, and the M1917 were primarily fixed in static positions as a form of area defense or denial. That was not novel, but the conditions of the war lent themselves perfectly to area denial tactics. However, the use of light machine guns such as the Lewis, Chauchat, and later the Browning was different. Before the United States entered the war, the Chauchat had been developed for walking fire, the continuous firing of automatic weapons by the troops as they advanced, and it continued to serve that function as the AEF joined the front lines.[83] As the troops advanced, the lighter machine guns fired at positions the heavier guns could not reach or target.[84] Once a sector was secure, these lighter machine guns were used in the defense until heavier machine guns could be brought up to the new defensive positions. During the First World War, the advent of these lighter machine guns was not the only mark of the "Revolution in Firepower" that made it into American service; shotguns and potential semi-automatic rifles also started to appear in greater numbers.

American Small Arms for the Future

The First World War was not the first-time shotguns saw front-line combat. During the Moro Rebellion in the Southern Philippines, shotguns, otherwise known as "Riotguns," and their knockdown power had a significant effect against Moro attacks. Winchester was a well-known shotgun manufacturer and produced hundreds of thousands for the civilian market. Similar to procuring M1917 rifles, the Riot Guns became another close

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[83] Paul Lockhart, *Firepower: How Weapons Shaped Warfare* (New York: Basic Books, 2021), 308.

[84] Washington, *History of Trench Warfare Materiel* (Washington: Government Printing Office, 1920), 27.

link between the U.S. Ordnance Department and Winchester. On August 25, 1917, Ordnance sought to procure about 20,000 riot guns with bayonets.[85]

The initial order from the Small Arms Division of the U.S. Ordnance Department was for 20,000.[86] This order included modifications already in production at the Winchester factory, but all complied with Ordnance requirements. In the last few months of the war, the U.S. Ordnance Department had no plans to acquire more shotguns for 1919, and production at Winchester ended short of 20,000.[87] Partially because of a smaller production line and shotguns not being a high-priority order, Winchester only produced a little over 12,000 of the 1897 shotguns.[88] Although the Winchester 1897 was twenty years old, it ultimately played a vital role in freeing up other equipment.

In addition to the shotguns, machine guns, and bolt-action rifles, the U.S. Ordnance Department explored a way to turn their M1903 Springfields into a repeating rifle with the help of what became known as the Pederson Device. The Pederson Device was developed as early as 1916 by John Douglas Pederson in cooperation with the Remington Arms Company. With the removal of the bolt from the M1903 Springfield, this device was designed to be inserted into rifles with minor design changes and turned into a semiautomatic pistol-caliber rifle.[89] The project was largely kept a secret until the

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85 Henry Brewer, *Memorandum of Conference at Small Arms Division, Bureau of Ordnance, in Reference to Riot Guns with Bayonets, to be used for Guard Duty in France,* 25 August 1917. McCracken Research Library. accessed April 11, 2023, 6. http://library.centerofthewest.org/digital/collection/p17097coll30/id/5792/rec/142

86 Henry Brewer, *Memorandum of Conference at Small Arms Division, Bureau of Ordnance, in Reference to Riot Guns with Bayonets, to be used for Guard Duty in France,* 6.

87 Henry Brewer*, Memorandum of Private ----- of the Production Division, Small Arms Section, Washington, Jan. 28th, 1918.* 2 July, 1918, McCracken Research Library. accessed April 11, 2023. 87. http://library.centerofthewest.org/digital/collection/p17097coll30/id/5792/rec/142

88 *Memorandum for Mr. Ormsbee on M'97, 25 July, 1918*. McCracken Research Library. accessed April 11, 2023. 95. http://library.centerofthewest.org/digital/collection/p17097coll30/id/5792/rec/142

89 Canfield, *U.S Infantry Weapons of the First World War*, 120.

summer of 1917, when Pederson and others gathered to demonstrate this invention to the U.S. Ordnance Department. The limited representatives were very impressed with the demonstration and quickly ordered that another demonstration happen over in Europe with the attendance of General Pershing. Pershing was fascinated with the device and in December 1917 recommended that the Ordnance Department procure 100,000 devices.[90] But production of the Pederson device was slow and would not ramp up until December 1918, one month after the armistice had been signed. Although the Pederson device did not see combat, the AEF planned to use it for the potential 1919 Spring Offensive.[91] The 1919 Spring Offensive had plans to incorporate all the technological advancements of the "Revolution in Firepower" into one considerable advancement over the battlefields of Europe.

When the U.S. entered the First World War, the U.S. Army was in a dire situation. It was recruiting hundreds of thousands of men and could not equip all of them with the standard service rifle. To supplement their demand, they quickly looked to the private sector and found a production line that had manufactured rifles for the British. At the Winchester Repeating Arms Company, the U.S. Ordnance Department saw the British line and believed it could be brought back into full production, but this time to produce an American version. Although there had been ideas to have private companies produce the Springfield rifle, its cost compared to an already set up production line made it too expensive. In addition, it was clear to some, including Rep. Tilson, that the U.S.

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[90] C&Rsenal, "History Primer 065: The Pederson Device Documentary," YouTube Video, 1:14:49, December 5, 2017, https://www.youtube.com/watch?v=M637KpEP1_E&t=3283s

[91] Doug Wicklund, "The Secret Weapon that Never Really Was – The Pederson Device," *NRA Blog*, accessed March 4, 2024, https://www.nrablog.com/articles/2017/6/the-secret-weapon-that-never-really-was-the-pedersen-device

would be equipped with the American Springfield and the M1917 rifle.[92] With some modifications to tooling, the Winchester production line quickly equipped American soldiers. Without the initial British contracts with American companies by 1917, the supply problem would have been even worse.

The First World War has become synonymous with the expanded use of machine guns, and just like the issue of rifles, the AEF experienced a shortage of arms and training. In the war's initial stages, the U.S. had to rely on their ally's production of machine guns, especially the French Hotchkiss and Chauchat. Here, the U.S. trained with foreign equipment on new uses of machine guns, such as walking fire, and in 1918, the first American-designed machine guns adopted during the war reached the front lines. Although they did not have a large impact on the war, they had come about due to the lessons drawn from the experiences of the First World War. At the end of the 1910s, the U.S. completed the "Revolution in Firepower" with some of the most advanced small arms in the world. With world-standard bolt action, two forms of machine guns, and other experimental small arms, the U.S. Ordnance Department had observed and adopted many new technologies from the "Revolution in Firepower."

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92 Washington. *National Defense. Torpedoes. Rifles, and Machine Guns: Speech of Hon. John Q. Tilson of Connecticut in the House of Representatives*, 26 March, 1918, 9.

Conclusion

Allied generals planned a 1919 Spring Offensive to break the German front lines with a combination of ground and air attacks. The initial wave was to be accompanied by tanks and mobile infantry armed with an assortment of small arms. The American Doughboys, much like in 1918, were to be armed with M1917 Enfield's, Browning Automatic Rifles, M1897 Shotguns, and Springfield M1903s with experimental Pederson devices, to name a few. These small arms represented the height of the "Revolution in Firepower," where technology had progressed to the point where an individual soldier could have the same lethal firepower as a dozen soldiers did in the 1880s. Now, the Americans were assigned to push alongside the British and French forces to break the German lines in an offensive that never occurred. On November 11, 1918, the armistice was signed, and the fighting ended, but negotiated peace treaties took a few more years.[1] The guns stopped firing, and the U.S. emerged victorious with some of the most advanced small arms incorporated into their army. Within roughly forty years, the U.S. Army and Ordnance Department had adopted some of the more forward-thinking small arms, but they also experienced challenges as technology progressed so fast.

The U.S. Army Ordnance Department in the 1880s started experimenting with some of the new technologies that were spreading worldwide. Cartridge magazines and new operating mechanisms allowed individual soldiers to increase their firepower. These experiments and testing ended with the adoption of Krag-Jorgenson, the first magazine-fed, bolt-action rifle of the U.S. Army, incorporating the newest technologies of the era. In addition to the Krag, the Ordnance Department began to examine some of the first

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[1] Richard S. Faulkner, *Pershing's Crusaders: The American Soldier in World War I* (Lawrence, University Press of Kansas, 2017) 602.

generations of machine guns. The first true machine gun, the Maxim Gun, was understood to have a substantial impact on future conflicts. Still, with hundreds of mechanical Gatling Guns already in service, the Ordnance Department did not at first invest in the new machine. The Ordnance Department was willing to adopt a new rifle in line with other industrialized countries, but it was not in favor of machine guns because of ideas of ammunition conservation, technical complexity, and uncertainty of how to deploy this new small arm. Procuring these small arms in large quantities became problematic as the U.S. entered the Spanish-American War.

The Spanish-American War was a catalytic moment for the U.S. Army and Ordnance Department. Although the U.S. had defeated Spain with relative ease and gained multiple territories, including Puerto Rico and the Philippines, the small arms the U.S. Army had adopted only a few years before had become obsolete and were too few in numbers. In the wake of the war, the Ordnance Department tested multiple new rifles that closely mimicked the Spanish Mauser American soldiers had faced in Cuba, resulting in the Springfield M1903. In the realm of massive repeating fire, the Gatling and Colt guns had shown their worth in combat, but even with the lessons of the Spanish-American War and observations of other conflicts, such as the Russo-Japanese War, the U.S. Army did not restructure its doctrine of how best to employ the machine gun. The Ordnance Department, however, did adopt more machine guns in the years between the Spanish-American War and the First World War. The same procurement problems the Ordnance Department had experienced at the beginning of the Spanish-American War would repeat themselves as the U.S. entered the First World War in 1917.

At the beginning of the First World War, the U.S. did not have enough equipment to supply the army being sent to fight in France. Critically low on supply, the U.S. had to turn to private companies for rifles and to its allies for new machine guns. The P14 Enfield production line was initially set up for the British at Winchester, and other companies were quickly repurposed for the U.S. Army's needs and manufacture the M1917. Once the AEF arrived in Europe, it had to be trained in trench warfare, including using British and French-produced machine guns and many regiments also had to borrow rifles upon their arrival in the theater of war.[2] Still, by the end of the conflict, the AEF had brought together some of the most advanced small arms of all the warring nations. Within about forty years, the U.S. Ordnance Department had experienced the entire "Revolution in Firepower" and had come away as one of the forerunners of adopted small arms.

From the 1880s to 1918, the U.S. Ordnance Department was slow to adopt the newest technologies, but it was always aware of these breakthroughs regarding small arms. Instead of adopting the newest and less mature technologies, the U.S. Ordnance Department waited until the systems met its standards and expectations. Some small arms, such as the Krag, were almost immediately in need of replacement, but that was because within the eight years from adoption to surplus production, small arms had progressed and incorporated multiple new technologies. Machine guns took much longer for Ordnance to test and procure, which ultimately affected American small arms and the performance of the AEF during the First World War. However, some U.S. Army and Ordnance Department personnel knew of the firepower provided by machine guns

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[2] Paul Lockhart, *Firepower: How Weapons Shaped Warfare* (New York: Basic Books, 2021), 308.

because of their utilization against Spain in the Spanish-American War and because they oversaw the procurement efforts of new machine guns during the 1900's. A crucial aspect of understanding the procurement of these new systems was that the U.S. realized the importance of technologies coming out of this revolution through combat.

It is common to hear that technology shaped warfare and the type of conflict, but the inverse is valid for this period and the U.S.[3] The significant conflicts the U.S. fought during the "Revolution in Firepower" affected the procurement of future technologies by the Ordnance Department. Learning of the effects of soldiers going up against the Spanish Mauser made the U.S. Army and Ordnance Department realize the need to adopt and produce more small arms. The U.S. involvement in the First World War increased the amount of machine guns in service but also pushed designers like John Moses Browning to invent new lighter machine guns for the American war effort. The conflicts the U.S. was participating in created pressure on the Ordnance Department to look at and test the new technologies that were starting to become more prevalent in militaries elsewhere. However, procuring a system and producing small arms are two separate issues, and the Ordnance Department was constantly unable to produce the necessary number of small arms for the wars in which the U.S. became more involved because the production of new rifles came during peacetime when there wasn't as high of demand.

The issue of quantity versus quality was a significant part of the U.S. procurement difficulty during the "Revolution in Firepower," and this was not solved until the end of the First World War. Providing high-quality small arms was never a problem for the Ordnance Department, as it constantly tested and observed the technologies emerging

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[3] Max Boot, *War Made New: Technology, Warfare, and the Course of the History, 1500 to Today* (New York: Gotham Books, 2006), 10.

from the revolution. They adopted the Krag, based on the Danish service rifle, and then later adopted the Springfield M1903, based on a Mauser, a world standard at the time. Providing enough rifles and machine guns for rapidly expanding armies, in 1898 as mush as in 1918, proved a more difficult problem. Due to a lack of supply, the U.S. army had to adopt the M1917 as its primary rifle of the AEF, which was again based on a Mauser design but with some improvements.[4] Machine guns were similar, and although the U.S. Ordnance Department was slow at adopting the Maxim or Colt guns, they had been consistently testing them since their inception.

Although quality changed over time, the Ordnance Department struggled to produce enough small arms for its soldiers. During the Spanish-American War, the Ordnance Department was short over 100,000 rifles and had to pull out the older and obsolete Trapdoor Springfields. The rapid influx of troops in 1917 and 1918 left the Ordnance Department short of nearly three million rifles. In addition, the Ordnance Department never ordered large amounts of machine guns. Even before the U.S. entered the First World War, the Army, and the Ordnance Department had disregarded the lessons of the Spanish-American War and they paid insufficient attention to the struggles faced by the Entente. The problem of quantity can partly be explained by the shift from smaller frontier conflicts to much larger, globe-spanning wars. Small frontier units had been used on the American plains; by the First World War, America had the First Army sent to France with 600,000 soldiers.[5] With these more significant conflicts came greater

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4 Faulkner, Pershing's Crusaders, 213.

5 Brian McAllister Linn, *Real Soldiering: The U.S. Army in the Aftermath of War, 1815-1980* (Lawrence: University Press of Kansas, 2023), 76.

demands for materials, and the Ordnance Department responded by increasing production at the federal arsenals and procuring from private industry.

After the First World War, the Ordnance Department continued to work on a self-loading rifle, and in the 1930s, the U.S. was one of the first nations to start equipping all its soldiers the M1 Garand. The “Revolution in Firepower” affected all nations, but this rapid technological transformation drastically changed the U.S. Army's small arms. Going from black powder breechloading rifles to self-loading rapid-fire machine guns was a significant leap that has not been repeated in small arms design. The U.S., as it experienced this revolution, may have seemed to be slow in the uptake, but the Amy and Ordnance leaders were fully aware of the changes to small arms technology and, by the end of 1918, had procured some of the most advanced types. Rifles and machine guns are only one part of this “Revolution in Firepower.” Still, they represent a fast-paced change to the ways of war and the development of technology and industry in the U.S.

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