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ARMY RIFLES

A PAPER READ BEFORE

THE OHIO COMMANDERY OF THE LOYAL LEGION,

FEBRUARY 5, 1908,

BY

COMPANION FREDERICK W. HINKLE.

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Paper

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Companion Frederick W. Hinkle,

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Cincinnati, Ohio,

Read before The Ohio Commandery
of The Loyal Legion,

February 5, 1908.

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AIRBORNE

ARMY RIFLES.

The events of the past ten years, particularly the Spanish and Japanese Wars and the present cruise of our great fleet have aroused in the American people an interest in modern implements and methods of warfare, such as has not been in evidence since the dark days of our great Civil War.

We are essentially a peace-loving Nation. There is probably no "Great Power" in the world whose soldiers and sailors are so rarely seen upon the streets, and yet there is a latent military spirit in the people, which long years of peace and prosperity cannot eliminate. So in these latter years, since our power has reached out into the four corners of the earth, and met and clashed with that of other nations, that spirit has manifested itself in a widespread interest in our army and navy, and their equipment and fitness to protect our national honor.

Our attention having thus been attracted to military armaments, possibly some little discussion of past and present army rifles principally with reference to those used by the United States army may prove interesting and of some profit, especially if a few of the different weapons referred to, are placed before you for inspection. There is here a number of guns, mostly rifles, which illustrate roughly the evolution of the military rifle since the American Revolution. But a few preliminary words, briefly showing the growth of the use of gun-powder and the gun, and some of the inventions connected therewith, may be interesting.

The introduction of gun-powder into Central Europe was the beginning of the end of the Feudal system. It was an *introduction* into use, not an invention, for the properties of gun-powder were well known to Southern Europe, Spain and Greece for centuries before, and to Asiatic nations especially China and India as far back as the days of Moses, if the ancient writers are correctly translated and interpreted. The invention, therefore, is a matter which it would be idle to discuss. That Alexander the Great met with it, to his misfortune, in India, and that the Chinese used it as we do now, hundreds of years before the Christian Era, are facts which are rather generally admitted.

There is good evidence extant that Berthold Schwartz, a monk of Friburg in Germany, deserves the credit of first introducing gun-

powder into Central Europe. He obtained his knowledge from a book published by Roger Bacon in 1267. Bacon got his information in Spain, where he read the book by Marcus Graecus published A. D. 846, and entitled "Liber Ignium," which gives the formula for gun-powder precisely as our black powder is made. This book of Graecus is preserved in the Royal Library at Paris. Schwartz undoubtedly deserves the credit for introducing gun-powder into Central Europe, for it came into general use shortly after he published his alleged discovery. This was in 1320.

With great vehemence did the good Knights resist the innovation in war-fare thus rudely forced upon them by the use of fire-arms. Encased in almost impenetrable armor the bold Sir Knight was accustomed to gallop furiously about the field of battle seeking whom he might slay. Rarely was he killed or even wounded by foot soldiers. Even though unhorsed and unable to rise from the weight of their armor, yet as one writer says, "They could only be killed after they and their armor had been broken up like so many lobsters, with wood-cutter's axes. Well might James 1st. remark that defensive armor was a double protection, preventing the bearer from being injured or from injuring others."

Gun-powder put an end to this immunity. The veriest varlet armed with the arquebus could bring low the doughty Knight in his armor of proof, and the Knights who were brave as lions as long as they could not be killed, didn't relish it at all. Armor was thickened until the champion arrayed for the fray resembled nothing so much as a modern iron-clad, and sometimes smothered in his harness. But in vain; the bullet pierced his coat of mail and made him a back number.

But still the fire-arm had not reached the stage when it could be depended upon to win battles even as late as the seventeenth century. It was exasperatingly slow in loading, so slow that in one battle about the middle of that century, the slowest soldiers managed to fire only seven shots in a battle lasting from noon to eight o'clock in the evening. This was a heavy gun fired by a match held in the hand, but shortly afterwards the match lock and wheel lock came generally into use and greatly increased the rapidity of fire. The wheel lock was the first flint lock invented, and its principle appears to have originated from the domestic use of flint and steel to strike fire. It first came into use in 1515.

From the wheel lock, by a natural improvement, came the flint-

hammer-lock in 1630, a Spanish invention, the use of which was continued for over two centuries. The British Army used a flint lock as late as 1842, as also did the United States. They are still manufactured and exported to half civilized countries, it being considered inadvisable to give the natives too good a weapon.

About 1807 a Scotchman named Forsythe making use of an idea previously put in practice by the French, patented a gun in which the percussion system was first embodied, and thus another and perhaps the greatest step of all up to that time, was taken in the development of our modern rifle. "But it was 12 years later before the percussion cap as we know it, appeared; during this period guns were made with the fulminate in the form of a pill or capsule, the flash pan of the flint lock being retained for holding the pill."

The earliest fire-arms were all smooth bore weapons, some of them tremendously bell-mouthed, as the blunder-buss, and designed to fire a number of balls after the manner of our shot-guns. But about 1498, some unknown genius, a German as all writers agree, hit upon the scheme of grooving the interior of the gun barrel, not however with spiral grooves but with straight parallel ones. His only purpose was to facilitate the operation of loading and prevent leading and fouling of the barrel, for it was thought that the dirt of the barrel would settle in these grooves.

About the beginning of the sixteenth century some other blundering genius, probably Kutter of Nuremberg, thought that twisted or spiral grooves would take up more dirt than straight ones, and tried them, when to his astonishment he found that his bullet had an unheard of range and accuracy. Thus the idea of rifling gun-barrels was first touched upon. A few of them were made and given to a company of cavalry, called "Carabins," from which circumstance they took the name "carbines."

It was over a hundred years before this idea was actively adopted in military arms, but in 1631, William, Landgrave of Hesse-armed some of his troops with straight grooved rifle carbines; Frederick the Great used them in the "Seven Years War," and Sweden and France adopted them shortly thereafter, but conservative old England had only supplied one small corps of her army with the rifle at the time of the American Revolution; yet, in 1742, Robins had worked out the principle of the rifle and demonstrated that a ball revolving on the axis of the gun had greater accuracy and longer flight.

As one studies the evolution of the modern fire-arm one is more and more impressed with the truth, unflattering as it may be to nineteenth century invention—that the mediaeval gun maker had hit upon and elaborated to a remarkable degree all the ideas, with the exception of two or three, which our modern gun makers have adopted and use and profess to have invented. In the British, Paris and other European museums, are ancient arms of the *hammerless* pattern, with safety catches, and indicators on the triggers, revolvers and revolving guns of from three to twelve chambers antedating the introduction of the flint-lock, very creditable breech loaders, double barreled guns, and most curious to relate, repeating muskets firing as many as eight shots without reloading, one in particular almost precisely identical, with the exception of the metallic cartridge, with the Spencer rifle used in our civil war and since.

Even the idea of the Gatling and Nordenfeldt guns was touched upon and patents issued for weapons of this type.

Henry the Eighth had a breech-loading arquebus somewhat similar in construction and method of loading to the Snider and Winchester rifles of our day. In 1808, a Paris gunmaker invented a percussion breech loading gun in which the cap was affixed to the breech of the cartridge. A needle of steel pierced this cap when the trigger was pulled, igniting the charge. A slight modification of this gun in the shape of the "Prussian Needle Gun," won the Franco-Prussian war.

Not stopping to cite further examples of ancient inventions which have been slightly modified and adopted by modern gun-makers, and their name is legion, but coming at once to the American "War of Independence," we find the British army using as its regulation arm the flint-lock smooth bore, known familiarly as "Brown Bess" or "Queen's Arm." The bore was over three quarters of an inch in diameter and the bullet, which was generally somewhat smaller than the bore, was wrapped in a loosely fitting patch which formed a cartridge. Its effective range was about one hundred and fifty yards. Crude as this weapon was, and far behind the inventions of the times, yet its simplicity and ease of loading, as compared with the rifle of the day, made it a most serviceable military weapon. With the exception of the change from flint to percussion lock it was retained as the regulation arm of the British Army until about 1850.

One corps of the British army, however, during this war, was armed with a breech-loading gun, known as the Ferguson musket. It

was a flint lock, and the breech mechanism consisted of a large screw running perpendicularly through the breech and attached to the trigger guard. When the guard was turned, the screw sank down through the breech, leaving an opening in the top of the barrel through which the charge was inserted. The screw was then raised to its place closing the barrel. One of these is now a loan exhibit in our National Museum.

Our fore-fathers, however, less favored than their opponents, had to depend upon a variety of weapons. Although many of the regiments had guns of the "Brown Bess" type, yet the great majority of the men, at first, carried their own weapons, shot-guns, muskets of every size and description and some rifles. The slope of Bunker Hill bore witness to the destructiveness of these weapons at short range. We do not wonder that Putnam made his men hold their fire until they could see the whites of the red-coats' eyes. Later, through the good offices of Lafayette, the United States received large supplies from the French Government of the Charleville Model 1763, a heavy, smooth bore flint lock, and after the Springfield and Harper's Ferry armories were established in 1795-6, this continued to be the model for the guns manufactured there. As early as 1804 rifles of this type were produced at Harper's Ferry.

Yet there were arms in the Revolutionary forces which far surpassed anything that the British had—or had ever encountered.

An article in a recent magazine on the subject of the birth of the American Army says: "The rifle had been introduced into Pennsylvania about 1700 by Swiss and Palatine immigrants and was made by them at various border towns in that colony 20 years before the Revolution. Our frontiersmen, appreciating the superior accuracy of the grooved barrel adopted the rifle at once and improved upon the German model with such ingenuity that within a few years they had produced a new type of fire-arm, superior to all others, the American backwoods rifle." At the outbreak of the Revolution the rifle was used only in Central Europe and along the Western frontiers of our central and southern states. Armed with this back-woods rifle the men of the west came to the assistance of their eastern brethren, and were organized into regiments of riflemen, which cost the British dear before the long war was over. They were employed as sharp shooters, and ere long the British pickets found that it was unsafe to expose their heads even at a distance of 400 yards. The same writer quoted above says: "So frequent became the return of officers, pickets and artillerymen shot

at long range, that Edmund Burke exclaimed in Parliament, 'Your officers are swept off by the rifles if they show their noses.'

In the British camp, the riflemen, "clad in their Indian hunting shirts," were called, "Shirt-tail men with their cursed twisted guns, the most fatal widow and orphan makers in the world." With this rifle-corps, which adopted Indian methods, began the modern system of warfare, fighting in open order as skirmishers, taking advantage of every available cover, and picking off the officers or particular men. The first pitched battle in which rifles were exclusively used by one of the Armies, was at King's Mountain, where the British, under Ferguson, the inventor of the breech-loader of which I have spoken, and with which some of them were armed, met the Tennessee back-woods riflemen. Ferguson was killed with 390 of his men and lost 716 prisoners, while the total loss of the Americans was 47 killed and 60 wounded, although our forces charged up a mountain far more difficult than the heights of Bunker Hill or Fredericksburg.

During the years that elapsed between the Revolution and the War of 1812 one great improvement in military arms was brought out, namely the invention of the percussion system, by means of which the flint lock and priming pan were partially done away with, at least for military guns. At first the fulminate was placed in the old priming pan and struck by the hammer. Later it was placed between two small pieces of paper forming a disk like the caps now used in the toy pistol. Then the idea of placing the fulminate in a copper or tin cup which fitted on the nipple of the gun was evolved. The first mentioned was probably the plan used to fire certain guns manufactured for the United States Army at Harper's Ferry, during the years of the War of 1812. One of them I have here, but unfortunately it has probably been altered to use caps. This is a smooth-bore, beautifully brass-mounted and having a box to hold the fulminate. On the lock plate is the inscription "Harper's Ferry, 1814." The extreme weight of the gun at the muzzle end of the barrel, is a remarkable feature of it. It was patterned after the sporting gun of the day. With such guns as this the Americans were no better armed than their British opponents, and the chances are that few of our soldiers had anything but the old style flint-lock. But there were many descendents of the old Revolutionary riflemen who were true to their family traditions, and when called upon to defend their country carried with them their back-woods rifles and used them well. One writer, speaking of the battle of New Orleans,

says, at this battle, "the backwoodsmen intrenched on an open plain it is true, but outnumbered two to one by the pick of Wellington's veterans from the Peninsular War, killed 700 of the enemy, wounded 1,400 and took 500 prisoners, while themselves losing but 8 men killed and 13 wounded." It reads like an account of some naval battle of the late Spanish-American War, in the matter of disparity of losses.

It may seem strange, seeing the success of the rifle as used by small bodies of troops in these two wars that the United States and other Governments did not use it exclusively to arm their men. For this apparent neglect there were several weighty reasons, the principal one being the difficulty and slowness of loading. In order that the spherical bullet might take the rifling it was made quite as large as the bore, and when placed in the muzzle could be forced down through the barrel only by the exertion of great force, causing the lead to spread into the grooves. Other methods of loading were tried in order to force the ball to take the rifling, such as loading at the breech with a ball a trifle larger than the caliber, using a ball with a rim to fit the rifling, surrounding the ball with a patchen which followed the grooves, and having a shoulder or an iron stem in the base of the barrel upon which the ball rested and could be hammered into the grooves. The latter was Thouvenin's great improvement in rifles. All of these made slow loading, leaded the gun rapidly and destroyed the shape of the bullet, thus injuring its carrying qualities and accuracy. The recoil also was very great and the gun necessarily heavy. At a time when battles were fought almost hand to hand a light strong gun and one quickly loaded was very desirable.

That the percussion cap was not generally adopted by the United States as soon as invented is another surprising fact. Although this system had been well elaborated, and proved more effective and easier of manipulation than the old flint-lock, yet the United States held on to the latter at least as late as 1838. In that year there was published a book entitled "Abstract of Infantry Tactics for use of the Militia of the United States," the avowed purpose of which was to train the militia in the tactics and use of the weapons of the regular army. This manual was prepared under an Act of Congress by General Winfield Scott and others, and amongst other features gives careful instruction on how to handle, load and fire the army weapon, a flint-lock musket with priming pan and paper cartridge. It also contains a separate set of instructions for light infantry and riflemen. These carried flint-lock

rifles. So that while the continental Europeans, notably Prussia and Sweden were arming their troops with breech-loading, percussion cartridge rifles, our Government and the British were conservatively holding on to the smooth-bore or rifled muzzle-loading flint-lock. The Prussians adopted the needle gun in 1841 and used it with winning effect in their wars of the 60's and the Franco-Prussian War. It will be briefly described later.

That there were good reasons for not adopting the percussion cap system is very probable, one being that the Government was experimenting with Maynard's continuous priming contrivance, patented in 1845. There were good reasons also why the breech-loader of the day was a faulty weapon. Two inventions shortly to be made were necessary to make a rifle loading at the breech a success. Its great fault was that using as it did a paper or linen cartridge which was consumed in the discharge, the breech action became clogged and fouled with burnt paper, powder dirt and smut, so that after a few shots it became almost or quite impossible to close the breech. Then, too, the gases escaped through the chinks of the mechanism, lessening the range of the bullet and sometimes burning the soldier's face or hands. At times also the breech lock would blow out and nearly fracture the holder's skull. Numbers of such breech-loading rifles were invented by the Americans during the years that elapsed from 1812 to 1860, notably the Gilbert-Smith rifle which was taken to England in 1838 and submitted to that Government, but rejected because of the escape of gas at the breech.

An interesting English development of the idea of rifling during these years was the Lancaster Patent. Lancaster evolved the idea of constructing a smooth bore barrel, which *itself* twisted after the manner of the grooves of the rifle. While this gun was as effective as most of the rifles of the day, it has proved impracticable as the power of explosives has increased.

Our government offered premiums for the invention of good effective breech-loaders and later of magazine rifles, which materially stimulated the production of such weapons.

Meanwhile men were perfecting and inventing two ideas which were destined to revolutionize gun making and make the rifle the terrible weapon it now is. From the very inception of the use of the percussion cap there had been efforts to perfect a cartridge which should hold its own fulminate, and which should do away with the additional movement necessary to prime the gun. As long as the cap

was separate from the cartridge it was found necessary to use a self-consuming cartridge, which fouled the breech rapidly. The first cartridges that contained their own caps were also paper or cloth as for instance that used in the needle gun where the cap was set on a wad at the base of the bullet and the needle had to pass through the powder charge to explode the cap. This gun, as an old German soldier of this city has told me, was useless after several dozen shots, unless cleaned. In 1836, however, a Frenchman patented a heavy paper cartridge with metal base which contained the cap. From this cartridge dates the success of the breech-loader, for all pin-fire guns still use the same type of cartridge except that in the course of time metal cases have come into use instead of paper. To Messrs. Smith & Wesson, American revolver makers of great renown, is due the credit of perfecting the metallic cartridge. Maynard, the inventor of the continuous primer, invented it.

The other great invention of these years was the Minie Ball. The old plan of loading a muzzle-loading rifle had been as I have shown laborious and productive of much time and energy wasted. So inventors set to work to make it easier by altering the ball. Several belted balls were tried, that is bullets with projecting belts around their bases, which were forced into the rifling by ramming, but these were not a success. Other plans were tried, but it was not until 1848 when Minie invented his hollow-based grooved ball that the difficult problem was solved. Minie has generally received the credit for the invention, although it is a fact that the principle of the expanding ball had been fully explained in 1836, by an Englishman named Greener, and it is probable that Minie had read this man's book.

The Minie ball, so familiar in shape now, contained in its hollow base an iron cup or wedge, and later a wooden plug, which upon the discharge was driven farther up into the hollow, thus expanding the base of the bullet which had several circular notches, into the grooves of the rifling. This is the regulation type of bullet now, although the iron cup and notches on the base have disappeared, being proved unnecessary.

To the invention of the metallic cartridge and the Minie ball the success of the breech-loader is entirely due. But for many years after these inventions had been perfected the United States were not ready to adopt, as their regulation arm, a gun loading at the breech. They held on to the muzzle loaders, but breech-loading rifles which did not

use the metallic cartridge but did use the Minie ball, were numerous, and some of them most curious.

What is said to be the first successful American breech-loader, was the invention of Colonel Hall in 1811. Some of the cavalry of our army were armed with this gun as early as 1818 and it remained in use up to the time of the Mexican War, but it could not have been a satisfactory weapon. Its most interesting feature is that the sights are not placed along the middle of the barrel, but to one side, the hammer obstructing the usual line of sight. It was constructed both with the flint and the percussion lock.

Another odd breech-loader which I have here and which is said to have been used in the Mexican War is interesting because of the ingenuity and simplicity of its breech, and also because it uses, as far as I can learn, for I never found anyone who could explain its action, what was called the continuous primer. The breech block is drawn back by a lever lifting up and backwards in a manner somewhat similar to the Winchester action reversed, while the priming, which was probably a series of small discs of fulminate placed upon a paper strip, was contained in a circular box beneath the hammer, and was forced out by cocking the hammer which, oddly enough, is on the side of the gun and cocks back horizontally.

On pulling the trigger one disk was cut off and driven against the nipple by the hammer.

The gun is a rifled cavalry carbine, of large caliber and made in 1847. It is stamped with the letters "U. S. N." and the name "Jenks," who invented and patented it in 1838. The pull of the trigger is terrific, and it is still in good condition.

One of the first and best of the American breech-loaders was the Sharp's carbine. When first introduced, this gun was used with a made-up linen cartridge ignited by a percussion cap, but later a patent primer was applied, and still later a metallic cartridge was used with an exploding pin. The breech-block falls by lowering the trigger guard, exposing the chamber. The linen cartridge being inserted, the block is raised, its sharp upper edge cutting off the end of the cartridge and exposing the powder to the spark from the nipple. This rifle was submitted to the United States government in 1850 and highly recommended. A portion of the English cavalry was armed with it in 1857. Its defect was the old one of breech-loaders—escape of gas, and rapid fouling of the breech.

By 1859 the former arms of the United States Army had been entirely superceded by the Springfield rifle and rifled musket.

This was the result of the recommendation for adoption in 1855 by Jefferson Davis, Secretary of War, of the following arms:

Caliber 69 Rifled Musket, Model 1822, Altered.

Caliber 69 Rifled Musket, Model 1842, Altered.

Caliber 58 Rifled Musket, Model 1855, New.

Caliber 58 Rifle, Model 1841, Altered.

Caliber 58 Rifle, Model 1855, New.

Caliber 58 Pistol Carbine, Model 1855, New.

The Muskets Models 1822 and 1842 were bored as rifles, while the rifle model 1841 was re-rifled and the caliber increased from 54 to 58. All of these arms were fitted with Maynard Magazine Primers. The model 1842 musket and rifle were the first regulation service arms of the United States with the percussion lock.

At a range of 300 yards the highest point of the trajectory of the new Springfield Model 1855, was not quite four feet. It resembled strongly in appearance and shooting qualities the English Tower and Enfield rifles, and was second to no muzzle-loader in its efficiency.

At the breaking out of the Civil War, then, the United States forces, what there was of them, were for the most part armed with this Springfield rifled musket or rifle, of which this is an example. The Maynard primer had, however, disappeared. The patriotic efforts of Secretary Floyd had been successful in depleting the government arsenals of over one hundred thousand muskets, so that at the outset at least the Confederate army was armed as well as or better than the Federal. The arsenals were set to work, however, with great energy and soon began to turn out rapidly the rifles necessary to arm our new army of volunteers. Not only was a strong effort made in this direction, but various bodies of state troops were encouraged to provide themselves with arms of their own choosing and purchase. Invention also was greatly stimulated by inducements offered by the Government and innumerable new styles of breech-loaders, and several magazine rifles made their appearance. Of these latter, the Spencer rifle was beyond question the most effective and was the first really successful magazine rifle ever introduced. It was patented in 1860, and in that same year offered to the United States Government, and highly recommended. Some of the volunteers were armed with it and rendered good service throughout the war. It was considered that one man

armed with the Spencer rifle was equal to six provided with the muzzle-loader. The Confederates viewed it as a diabolical weapon, which was loaded on Sunday and fired throughout the week. The magazine was in the stock of the rifle, the metallic cartridges being dropped into an opening in the butt, and by a spiral spring and lever action of the trigger guard, forced one by one into the barrel. The lever action also ejected the empty shells of the exploded cartridges. It was found that this rifle could be fired 7 times in 10 seconds, but only 15 times in one minute, as it took some time to re-load.

Other rifles that were in more or less use by the Federal forces were the Enfield and Tower patterns, English rifles of the type of the Springfield, the Ballard, Henry and other effective breech-loaders, soon to be noted and various early model flint-locks altered to the percussion lock.

The Peabody rifle, also an American invention, was recommended by the Government in 1862. It was the fore-runner in principle of the famous Henry, Martini, Wesley Richards and Winchester rifles, the latter of which is hereafter described.

One company of New Hampshire sharpshooters, under a Captain Jones, was armed with the Berdan rifle, a telescopic sight, small caliber muzzle loader. It was a fine rifle but scarcely suited to long marches and rapid assaults, as it is variously stated by authors to have weighed from 32 to 40 pounds. About nightfall after a long day's march or fight, the bold sharpshooter must have thought he had an elephant on his hands.

Another effective and ingenious weapon was the colt revolving rifle constructed after the plan of Colt's famous revolvers and weighing in the neighborhood of 15 pounds. Although a heavy gun, it was highly thought of both by our officers and the British. This particular gun was used on the Mississippi fleet by a Cincinnati.

Many other breech-loaders received consideration by our Government, both before and during the Civil War, but to enumerate them would take up more time than is allotted to me this evening.

Among the best of them were the Smith, Gallagher, Merrill and Burnside patents, all of which I have here. The latter was the invention of General Burnside and was declared in 1857 and 1858 by a Commission of Army Officers to be the most satisfactory breech-loader submitted.

A few of the Sharps, Burnside, Merrill and Colt type were issued to our troops in the late fifties, by way of experiment.

But in 1861 the regulation arm of the United States Infantry was the Springfield rifled musket or rifle, a good weapon, but with certain defects. Like all muzzle loaders it was slow in loading, if it missed fire either the gun was taken apart to remove the defective cartridge or the soldier in his excitement rammed in charge after charge on top of it and thought he was firing each time he pulled the trigger. There was some years ago in the Governor's Island Museum a barrel of one of these rifles into which the soldier had thus rammed six or seven cartridges, the first one finally exploding, bursting the barrel and probably killing the man.

But it was with this weapon that the Civil War was won, and our nation preserved as one nation. Therefore, though its modern successors make it look clumsy and archaic, it holds the place of honor in our grateful memories.

Since that war and through the impetus given by it and the Franco-Prussian War to the invention and improvement of military weapons, the gun-makers have been earnestly striving to turn out a breech-loading magazine rifle of such simple action and easy loading capacity that the most ignorant private could handle it intelligently. Speed was to be largely sacrificed to simplicity. As a first step our Government, in 1865, converted its Springfield muzzle-loader into a single-fire breech-loader by cutting out a portion of the barrel and attaching a breech action which, with few changes, is the same as supplied to our volunteers during the late Spanish War. It was, down to 1892, the regulation arm of our army—the caliber being gradually decreased.

In 1866 the Winchester Arms Company began to turn out its wonderful magazine rifle which both as a military and as a hunting rifle, is a marvel in the hands of an intelligent man. It is on the "pump-handle" principle, the trigger guard being lowered ejects the empty cartridge, cocks the trigger, and on being raised again puts a fresh cartridge in place ready for firing. The magazine is beneath the whole length of the barrel and holds from 9 to 16 cartridges according to their length. It can be discharged in nearly as many seconds as there are cartridges, and it may also be used as a single-fire gun, by cutting off the magazine. It is this rifle, which in the hands of the gentle wards of the Nation, our Western Indians, annihilated Custer and sent many a peaceful settler or blue-coated soldier of Uncle Sam to the White-man's happy hunting grounds. The later model, 30 caliber Winchester is one of the most powerful weapons in the world, but the complexity

of its parts and intricacy of its mechanism make it too delicate a weapon to be handled intelligently by the ordinary rank and file. And now this Company, and also other manufacturers are putting out automatic and self-loading guns. This gun is one of the latter type. The recoil ejects the empty shell and inserts a fresh cartridge so that the gun is always loaded till the magazine is empty.

Without going further into this type of rapid fire magazine guns of which the Winchester is the best, I will come at once to the rifles in which the events of the Spanish War have especially interested us.

First there is the Springfield rifle, so called, with which our volunteers were armed at the breaking out of the late Spanish-American War, and of which some mention has already been made. The action of the breech block is so simple that it hardly needs description, and besides practically this same breech has been used in converting the old Springfield into a breech-loader since 1865. The merits and defects of this gun have been so frequently discussed of late that they need but be mentioned. It is an effective gun at a comparatively short range, its breech block is ingenious and perfectly safe, and very simple, but its cartridge used the lead bullet and black smoky powder, it was a single-firer and was of 45 caliber, which is too large according to the latest ideas of warfare.

The use of the black powder made the Springfield a dangerous weapon for friend as well as foe, as was seen in the Santiago campaign and has been demonstrated in the Philippines since. The discharge of a Springfield was the signal for a concentration of the Spanish musketry and artillery upon the white puff of smoke, with the result that the regulars violently objected to being placed close to the volunteers. As rapidly as possible the Government displaced these Springfield rifles with the Krag-Jorgensen.

Another single-shot gun which this war brought prominently to our notice was the Remington. Probably no gun of recent years has had the world-wide use that this has, except the Mauser. Its strength, simplicity and ease of manipulation have made it a favorite among many peoples.

"The United States Magazine Rifle," or as it is erroneously called, the "Krag-Jorgensen" is an invention of two Swedes, Krag and Jorgensen, who patented the weapon and disposed of the patent to the United States in 1892. It was until recently the regulation arm of the United States Army, and was manufactured at the Springfield arsenal and so stamped. The name Krag-Jorgensen in no place appears upon

it. Since the adoption of the new rifle, these have been turned over to the State troops in large part.

The "Krag-Jorgensen," as I will call it, however, is a magazine rifle, firing five times without reloading, and has the bolt system of breech, which was first practically introduced in the Prussian needle gun in 1841. It may be interesting in this connection to compare the bolt action of this French Chassepot Model 1866, the French gun of the Franco-Prussian War, an improvement in every way upon the Prussian needle gun, which by the way, was a Frenchman's invention. The Krag is loaded by dropping five cartridges into the magazine in the side of the breech. A spring arm, called the "follower," forces them into place one by one as the breech bolt is turned and drawn back, the empty shell being ejected by a small lever which is also worked by the breech block or bolt. It is caliber 30, is sighted up to 1,900 yards, and can be fired as a single shot rifle at the rate of 42 shots to the minute. It has a muzzle velocity of 2,200 feet per second as compared with 1,300 of the 45 caliber Springfield, and the twist of rifling is one turn in 10 inches. The needle which strikes the cartridge cap works through the hollow bolt and is acted upon by a spiral spring which drives it forward upon pulling the trigger. The magazine can be cut off by a stop, a cartridge placed in the chamber with the hand, and the gun used as a single-firer. The ordinary way to use the gun is to load the magazine full, cut it off, and use the gun as a single-firer, reserving the magazine for some emergency when it is necessary to fire rapidly. The bullet has a cupro-nickel steel jacket enclosing a core of tin and lead composition. In range, flatness of trajectory and accuracy there is little to choose between the Krag-Jorgensen, the Lee Straight Pull and the Mauser, but I have heard some of our army officers and privates complain of bad points in the Krag. They considered the mechanism somewhat intricate, that there were too many parts and that it was difficult to take the gun apart. The latter is probably a good point as it prevents the soldier from tinkering with his gun. A special book of instructions as to the mechanism of the gun was issued by the Government to the officers, so that they might instruct their men in the use and management of it.

The gun used by our Navy during the Spanish War was the Lee Straight Pull, a fine magazine rifle manufactured by the Winchester Arms Co. It represents about the limit in smallness of caliber in military arms, being only a little over 23 caliber. It loads from above and is practically equal in efficiency to the Mauser or Krag.

The bolt action is very simple, being a straight backward pull, requiring but two movements to cock and load the piece, as compared with three in the Krag, Mauser and Springfield.

The velocity of the bullet of this gun at fifty feet from the muzzle is 2,500 feet per second. At a distance of fifteen feet the bullet will penetrate fifty-three inches of pine boards, while at a range of three hundred yards it rises only about nine inches above a horizontal line. This is a fair example of the power of these modern army weapons.

The Mauser rifle is, in the opinion of many experts, a superior weapon to the Krag-Jorgensen. It is a German invention of many years standing, in fact an outgrowth of the old needle gun. The principle of firing and manipulating the breech-bolt is practically the same as the Krag, but in several respects the action is much simpler and easier understood. The magazine is especially simple and open, consisting of nothing but a zig-zag spring, which can be removed in an instant with the assistance of a nail or small stick. When the magazine is empty, that fact is indicated by the stoppage of the breech-block on attempting to push it forward for firing. The breech-block may be entirely removed with great ease for examination or repair, or disabling the gun in case it must be abandoned, by pulling out a small arm on the left of the breech. But one of the best features of the Mauser is its simplicity and rapidity in loading. Five cartridges are held at their bases by a brass piece called a "clip." One end of the "clip" is placed in a notch in the top of the breech and with the hand the cartridges are pressed down into the magazine. The action of closing the breech pushes the first cartridge into place for firing. Should the magazine get out of order it may be removed or cut off and the gun used as a single firer. Should the spiral spring in the bolt break, a new one may be placed in position in less than a minute. The Mauser has been kept up to date by constant improvements. It is now the regulation arm of more than half a dozen nations.

This particular Mauser was surrendered by the Spanish at Santiago and sold by our Government with thousands of others to any one who wished to buy one. It is called the Spanish Mauser, is stamped with the Spanish arms, and was manufactured for Spain at Berlin, Germany. It is in perfect condition as far as its shooting qualities are concerned.

The new model Springfield recently adopted by the United States is a beautiful and powerful weapon. The model 1902 first adopted has been altered in some respects, and it is now one of the most effective of high power rifles. It is a 30 caliber bolt gun with central magazine and

is loaded from above with five cartridges from a clip which is ejected by the forward motion of the bolt. The barrel has four grooves with one turn in eight inches. The cartridges and bullets are practically of the same model as those of the Krag except that the Springfield cartridge has a groove instead of a rim about the base, and the bullet is much sharper at the point. The 45 grains of high power, smokeless powder which the cartridge contains, give a pressure of 4,200 pounds per square inch and a muzzle velocity of 2,300 feet per second, while at the distance of 1,000 yards the velocity has been determined to be 958 feet per second. With the magazine empty the gun may be used as a single loader by the insertion of one cartridge at a time. An interesting and valuable feature of the gun is the wind-gauge. A graduated scale at the base of the sight and a thumb screw enable the soldier to alter the line of sight so as to scientifically allow for the drift of the bullet due to a cross wind. This has had a wonderful effect upon the marksmanship of our men. Armed with this gun our army team not only won the international rifle shoot against the British and other teams, but also broke all records for these contests.

With the adoption of such arms, and the corresponding advances made in heavy ordnance and rapid fire and machine guns, war between two evenly matched and equally well armed nations has become a question of long distance shooting, of lying behind cover and blazing away at nothing, for there is no smoke to indicate the location of your enemy. There is nothing more interesting in the history of the recent Russo-Japanese War than the description of the Japanese trenches before Port Arthur. The Russian guns swept fields that were absolutely bare, not a particle of raw earth, or a blade of grass disturbed, indicated the presence of the enemy, yet in those fields, within a few hundred yards of the fortification, lay concealed an army of sixty thousand men. Four miles back the great Japanese naval guns roared and leaped upon their concrete foundations, sending their immense steel shells over a mountain range into the doomed fortress.

Infantry tactics must be adopted almost to the exclusion of cavalry, in actual battles, for no cavalry in column or mass formation could live five minutes under the fire of Maxim, Nordenfeldt or Gattling guns, backed by the Mauser, Springfield, Lee Metford or Winchester.

Neither can the enormous expense of war be longer tolerated, and it begins to appear that by perfecting weapons of destruction we are doing more and more to ensure perpetual peace.

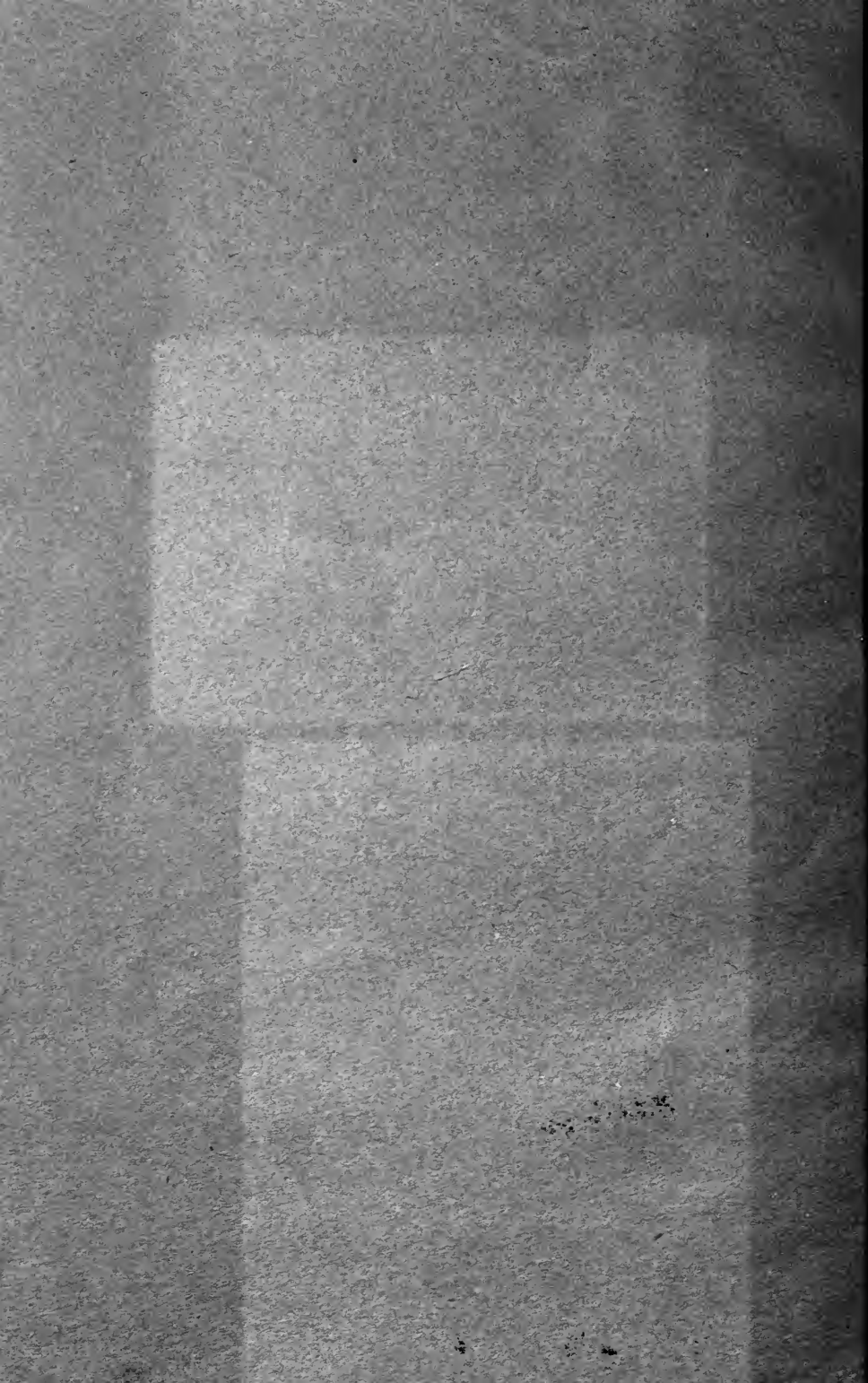
APPENDIX.

The following named weapons were displayed before the Commandery as illustrations to the paper :

- Flint-lock Musket—1809—Springfield-Charleville Model.
- Early Backwoods Rifle—Kentucky Model.
- Harper's Ferry Model—1814.
- Breech-Loading Rifle, Hall's Patent—1811.
- Breech-Loading Rifle, Jenks' Patent—1838.
- Breech-Loading Rifle, Sharp's Patent—1852.
- Springfield Rifled Musket—Model 1861.
- Spencer Magazine Breech Loader—Model 1861.
- English "Tower" Rifle—Model 1861.
- Colt Revolving Rifle—Model 1857.
- Breech-Loading Rifle—Burnside Patent—Model 1856.
- Breech-Loading Rifle—Smith's Patent—Model 1857.
- Breech-Loading Rifle—Gallagher's Patent—Model 1860.
- Breech-Loading Rifle—Merrill's Patent—Model 1858.
- Winchester Repeating Rifle—Model 1873.
- Winchester Self-Loading Rifle—Model 1905.
- Springfield Single-Shot Breech Loader—Caliber .45.
- Remington Single Shot Breech Loader (Sporting Model).
- U. S. Springfield Rifle (Krag)—Model 1895.
- French Chassepot—Bolt Gun—Model 1866.
- Spanish Mauser—Model 1896.
- Lee Straight Pull (U. S. Navy)—Model 1898.
- U. S. Springfield (Improved Dec., 1907)—Model 1903.

PISTOLS.

- Ancient Flint-Lock Pistol.
- Early Percussion-Lock, Muzzle-Loading Pistol.
- Spies (London) Percussion-Lock, Muzzle Loading Pistol.
- Colt Revolver—Model 1850.
- Williamson's Six-Shooter, 1864 (Copper-Nipple Cartridge).
- Colt's New Army Revolver.



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