

THE FUTURE OF WAR.

MILITARY OPERATIONS AS AFFECTED BY THE NEW WEAPONS.

IF all the world could be at peace, all the world would agree with Shakspeare in saying,

It was great pity, so it was,
This villanous saltpetre should be digg'd
Out of the bowels of the harmless earth.

But up to the present moment it would seem that disputes between nations must sometimes be referred to the sword. If the horrors of war can be increased, the necessity of adopting some other method of settlement may receive greater consideration. The number of those killed and wounded in combats is greater in proportion to the efficiency of the cannon and small arms employed; and the improvement in weapons, therefore, is likely to add a more sanguinary spectacle to future battle-fields, and may in time prove a great blessing by disposing nations to arbitrate rather than to fight.

Five and a half centuries ago gunpowder was first used upon a battle-field; but the progress in the manufacture and use of it, and of the weapons forged to fire it, has been slow and gradual until a comparatively late period. The public mind, deeply occupied by other events, has failed to appreciate the marvelous progress made in the proficiency of firearms since 1865; or how smokeless powders, the increased velocity of projectiles, greater accuracy of aim, longer range, and greater rapidity of fire, have revolutionized tactics and even affected strategy.

The United States, being in a measure secure by geographical position from the attack of foreign powers, and the desire to fight at home having been fully gratified, has not considered it so important in time of peace to prepare for war again, and has been slow as compared with other countries in making changes in the arms of the different branches of her military service. Resting serene, as it were, on her old arms, she could wait until the bugle sounded the first notes of alarm. Four years ago, after the adoption of great changes by all the other leading powers, the subject was practically considered by an able board of American army officers. They had, however, the great advantage of comparing and testing all other inventions with those of some of our own citizens, thus obtaining the best possible results. The rifle for infantry finally selected (called the Krag-Jorgensen from the names of the Norse in-

ventors) is known now as the United States magazine-rifle, model 1892, caliber 30. It weighs nine pounds and has an extreme range of 3000 yards, and the sight is graduated to 1900 yards. The steel-coated lead bullet weighs 220 grains, and with smokeless powder can be fired with an initial velocity of 2000 feet per second. Its penetration in hard oak is over six times that of the bullet of the Springfield or the Winchester rifle, with little or no injury to the bullet.

Recent experiments at Willets Point proved that shots fired at pieces of inch pine blocked together until a thickness of four feet was obtained would send the balls entirely through. Substituting oak for pine, the penetration obtained was three feet; while three quarters of an inch of iron plate could be clearly perforated. Experiments have been made abroad to test the effect of these small-caliber bullets on the bones and tissue of the human body. Where a bone is struck at range the injury is of an explosive character, and the resisting parts are pulverized. An artery, large or small, is cut as with a knife, while there is virtually no damage if the ball passes through muscles only. The magazine carries five cartridges, but is so arranged as to be cut off, that the rifle may be fired as a single-loader until the enemy gets into close quarters. The progress in the rapidity of fire of infantry guns since 1865 is marvelous. A soldier can now aim at an object and fire twenty shots in less than one minute, or if he rapidly throws his gun to his shoulder and fires without aim, forty shots may be discharged in sixty-eight seconds. If the cartridges in the magazine are reserved, and he begins the action by using his gun as a single-loader, he can fire fifteen shots with it in forty-seven seconds, or from the magazine throw a ball in the air every two seconds; whereas in our civil war forty rounds of ammunition in the cartridge-box and twenty in the haversack were a full allowance for a day's fighting.

If we suppose an enemy to be within range of this gun, and unprotected, and the marksman does not miss his man, and in one minute should fire twenty aimed shots, he would kill or wound twenty men; and if he could maintain this wonderful performance as the hostile lines come closer, he could in half an hour kill 600 men, and in the same time ten men could put *hors*

de combat 6000 of the enemy. While these figures depend on impracticable conditions, they serve to show the approximate results which might be obtained. Many men can kill a squirrel within range at every shot, but they would sometimes miss if the squirrel were returning the fire.

In a rapid rush on intrenched lines soldiers do not fire, and a brave, disciplined infantryman, well protected, with open ground in his front, should kill or disable, say, twenty-five of the charging lines in fifteen minutes; for if he should average only ten shots per minute he would discharge his gun 150 times in a quarter of an hour, and would kill or wound one man in six shots.

At Gettysburg, in July, 1863, had the Federal troops been armed with the rifle now being issued to the United States infantry, and with the present improved field-guns, Pickett's heroic band in the charge on the third day would have been under fire from start to finish, and the fire of massed infantry, combined with breech-loading cannon, would probably have destroyed every man in the assaulting lines. Pickett's right, when formed for the charge, was 1800 yards from the Union lines; and the magazine-rifle sight is graduated, it will be remembered, to 1900 yards. With the weapons then in use the Federals did not open with artillery on the charging Southern troops until they were within 1100 yards of their lines, and their infantry did not fire until they were within a much closer range. In the recent war between China and Japan, it was stated that a ball fired from a Japanese rifle called the Murata, similar to the United States magazine-rifle, struck a Chinese three quarters of a mile away in the knee, and crushed it to atoms.

The improvement in field-cannon has kept pace with that in small arms. It is doubtful whether troops can be held in column or mass formation within two miles of an enemy firing the present modern breech-loading field-guns. The extreme range of these 3.2- and 3.6-inch-caliber field-guns is over five miles, and when a suitable smokeless powder is found, they may throw a projectile eight miles. Had McClellan had these guns when his lines were five miles from Richmond, he could have ruined the city. No troops can live in front of them when they are rapidly discharging shrapnel, two hundred bullets to the case; and they can defend themselves without infantry support, and can be captured only by surprise, or when their ammunition is exhausted.

A steel shell with thick walls now does the work of the old-fashioned solid shot, and has in addition an explosive effect. The rapidity of fire has been much increased by the use of metallic cartridges which contain in one case

projectile and powder; and five rounds of shrapnel can be fired from a single gun in less than one minute. Then, with the Maxim automatic machine-gun, firing 650 shots per minute without human assistance, and the latest Gatling, delivering 1800 shots per minute, it would seem that the splendid exhibition of courage with which brave men have charged to the cannon's mouth will never again be recorded on the pages of history, for no commanding general is likely to order a direct assault on an enemy occupying strong defensive lines.

On the first day's fight on the Richmond lines at Mechanicsville, and along Fitz-John Porter's front, McClellan's troops, so armed, might have successfully resisted Lee, and at Malvern Hill might have destroyed the attacking force. With both sides so armed, Lee could have held his position in McClellan's front with a largely reduced force; but his flank movement would probably have been made with a much more extended circuit, which would have given McClellan an opportunity to hold Huger's and Magruder's divisions in his front at arm's length with a small force in his fortified lines, while he threw the greater part of his army on Longstreet, the two Hills, and Jackson at some point as they moved on a necessarily wide curve toward his right rear.

At the second Manassas, Pope's defensive position could not have been successfully assailed; and at Sharpsburg (or Antietam) Lee, with both flanks secure, could have easily defied the attack of an army twice as strong as the one which fought him there. At Fredericksburg, it will be remembered, the Union forces were obliged to cross a river two hundred yards wide, and pass over a plain nine hundred yards from the river, to Lee's position on Marye's Hill. With no smoke over the battle-field to decrease the accuracy of fire, and with the air filled with projectiles at high velocities, Burnside's army, if persisting in the attack, would never have fought another battle. At Chancellorsville and in the Wilderness the slaughter would have been immense on both sides, and there would not have been men enough in the North to have supplied Grant's army had he continued to pursue his "direct tactics" from the Rapidan to Richmond; and later that city and Petersburg would have been captured only by throwing circumvallating lines around them which would have embraced the railroads running into them, and cut off all supplies.

Black powder may never again be seen on the battle-field. Smokeless powders give greater force of explosion, and produce higher velocities, a flatter trajectory, increased accuracy of aim, and greater range. These powders consist of a basis of some high explosive material mixed with a suitable inert substance termed a "re-

strainer." The English "cordite," for instance, is a compound of fifty-eight parts of nitroglycerin and thirty-seven parts of guncotton, to which are added five parts of vaseline to restrain the explosive, and prevent the bursting of the gun. Such a charge will give double the amount of velocity and pressure of the ordinary gunpowder. If the knowledge that these modern guns will cover a field of battle with the bodies of the dead and wounded combatants, making war still more horrible, should preserve peace, the result would be a monument to those who have been most instrumental in perfecting these terribly destructive weapons.

The modern guns will make great changes in the art of war, and the plans employed in former campaigns by the great commanders will receive many modifications. Defensive battles will be at a premium, and defensive warfare will be simplified. Armies will manoeuvre for position, and the generals commanding them will gain fame by movements skilfully conducted to concentrate their scattered battalions at the proper time, with the purpose of forcing an antagonist to give rather than to accept battle. If a campaign with a designated objective point is planned, and the strategy is offensive on the part of one of the commanders, if possible his tactics will be defensive. Hostile armies will keep at greater distances, and in an open country out of sight of each other, unless they can take up a line at night, and intrench; and direct flank movements will not be attempted where troops are visible before the assault. Field balloons will locate the position, and photography mark the formation, of contending forces, while telephones and electricity will play prominent parts in the war drama. Night marching and night attacks will be more frequent, and columns of troops organized to charge stationary positions will be moved under darkness to close points so that the charge at dawn will occupy the shortest time possible.

Raging battles will be fought by infantry and artillery, and one of the problems will be the protection of the horses that draw the guns. Temporary field-works cannot shelter them, and unless hills afford protection they will perish in the leaden hail. Cavalry will not be employed on the main field of battle, but on the flanks of armies, against cavalry. Cavalry chieftains will no longer assail infantry or artillery, and no more charges will be recorded like those of Ponsonby at Waterloo, or Murat at Jena. This arm will still be effective in recon-

naissances, picketing, guarding trains, and as escorts; but except in small bodies its use for advance- and rear-guards will be diminished. The target presented is too large to be risked before field-guns firing with great rapidity, even if several miles distant, as well as before infantry rifles incessantly flashing a mile away.

Manoeuvring a cavalry corps with, say, 10,000 horses on a future battle-field would be a high type of cruelty to animals; but the regiments, brigades, and divisions composing it can still render good service. They can be moved with celerity long distances, and the troopers, except the horse-holders, can be dismounted and used as infantry, their modern carbines being nearly as effective as the magazine-rifle of the infantryman; but it will be most difficult to protect the horses while locating them in such a position as to reach their riders or be reached by them quickly, when necessary.

Perhaps the most interesting problem to be solved by those who organize armies in the future is the disposition and arrangement of the immense ammunition-trains. The greedy guns must be fed, and great will be their rapacity. Next to the commanding general and his principal assistants will rank in importance the field chief of ordnance, who has the location of supply depots and the management of the transportation of large and small cartridges to the combatants. The continual replenishing of caisson and limber boxes, the smaller charges for infantry during actual conflict, and the safety and efficiency of vast trains where electric or steam roads cannot be constructed, will require a brave, enterprising, cool, vigilant officer of conspicuous ability and executive capacity.

The medical departments, too, must be reorganized and enlarged to convey the disabled to field hospitals, for field ambulances cannot be placed close to battle lines, and the numbers of the wounded will be greatly increased.

The great captains of future wars will be those who fully comprehend the destructive power of improved cannon and small arms, and whose calm and fertile intellect will grasp the importance of so manoeuvring as to force the antagonist to give offensive battle, and who will never be without a "clear conception of the object to be achieved and the best way of achieving it." They will parry and fence like great swordsmen, but they will thrust only when the enemy rushes upon them.

Fitzhugh Lee.