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### FIREARMS AND RIFLE BREECH LOADERS.

The subject of firearms has engaged much public discussion during the past few years, and it is now attracting more attention than ever. Nearly all Europe appears to be an armed camp. England has two hundred thousand volunteer riflemen in constant drill; and at home, the notes of warlike preparations resound throughout the land. For two centuries, the free yeomen of America and the sturdy Switzers of the Alps were alone distinguished for skill with the deadly rifle; but it has now become the weapon of all armies, and there is no nation which can claim preëminence in the skillful use of it. The first correct writer on the rifle was Robbins, an English soldier, who wrote upon the subject about a hundred years ago. He explained the defects of the smooth bored musket, described the principles of the rifle, pointed out its superiority, and declared that, by whatsoever army it was adopted, "wonderful effects would follow." The theory of the rifle is now generally known, and the advantages of this weapon are duly appreciated. But there are great and essential varieties of rifles, and, of course, all cannot be equally good. There are breech-loading and muzzle-loading rifles; there is the light English rifle, with its smooth tapering barrel: the heavy Swiss rifle, with its thick breech and muzzle; and the long heavy American rifle, with its octagon barrel. There are also very great differences in the pitch of rifle grooves, and other features which are far from being unimportant. On these points much has been written that is more discursive than instructive. J. Chapman, author of the "American Rifle," and Colonel Jacob, of the East India army, are perhaps among the best writers on this subject. A series of articles on small arms has also been lately published in the *London Mechanics' Magazine*, by W. Bridges Adams, a practical engineer and writer on mechanical subjects. Some of his views are full of good sense, while others exhibit a want of thorough practical acquaintance with rifles.

European writers on firearms seem to be unacquainted with what has been done in America by our gunsmiths. The conical or elongated Minié projectile, which has become the favorite in Europe, is the old picket bullet used by American riflemen, with the addition of a chamber and plug in its stern. Adams says: "All forcible expansion of leaden bullets within the barrel by the explosive action of the gas is a mistake—it wastes powder and alters the form of the shot into irregularities, tending to irregular flight." He thus declares that the expanding bullet is not reliable for accurate shooting. We have seen several experiments made with the expanding and the old solid picket bullet loaded at the muzzle, in which the latter always proved the most reliable. It must be acknowledged, however, that the expanding ball has its advantages in warfare. With it, a soldier can load his rifle as easily and as fast as a musket; and if it is not quite so reliable, it is better for rapid firing than the solid ball. But it has no other advantage than this; and above all things, certainty of striking should be the first object in firearms; quick shooting if we can, but accuracy by all means.

American first class rifles are the best in the world. The foreign Enfields, Whitworths and Lancasters are far inferior to them. The reason of this is obvious. Rifle shooting has been a favorite American amusement

for a hundred years, and it has been a matter of national pride, as well as of security, to excel as marksmen. The greatest care and the highest mechanical skill have been called into requisition on the part of our gunsmiths to make perfect rifles, and they have been successful beyond all that Europe can boast. A Wesson, a James' or a Fish rifle is always a "dead shot" in the hands of American marksmen: the instrument, when in proper order, never fails.

At present, we believe that the muzzle-loading rifle, with the tight fitting conical bullet, is the most reliable, and the principles involved in its construction are few and simple. The barrel should be of the best close-grained cast steel, and its weight sufficient to give it stability. It also appears to be advantageous to have the barrel of an octagon form, and of the same diameter from end to end. When the charge expands in the barrel of a rifle, a series of undulations are produced, which operate to give irregularity to the flight of the projectile. The angles of the octagon rifle barrel tends to arrest these undulations. This was discovered long ago by our backwoods' marksmen; but this principle does not seem to be appreciated by most army officers, who have provided round barrels for their rifles. The size of the bore in rifles is a matter of convenience and choice. The larger the bore the greater proportionately should be the weight of the barrel, to give it stability. The interior of the rifle should be as smooth and polished as the inside of a steam cylinder, to avoid friction in the passage of the bullet. There is quite a difference of opinion as to the best length for rifle barrels. This is an important feature, because the pitch of the rifling is always in accordance with the length of barrel. The heavy, long western rifle, with its moderate spiral, is considered by many persons to be the most reliable; while others assert that a short barrel, with a slow starting spiral and an increasing twist towards the muzzle, is as reliable, and is preferable to the long barrel. The number of grooves in a rifle is not of much importance—three are better than a dozen—provided the bullet be made to spin properly; they should be as shallow as possible, however, to prevent windage. The German rifles have short barrels and a rapid twist. Colonel Jacob states that he found, by many experiments, that a barrel two feet long, with the grooves full and of a breadth equal to the lands, and giving a revolution once in three feet, was equal to barrels two and a half and three feet long. The muzzle of a rifle should be perfectly true; for if there is the least defect at the issue where the bullet leaves the barrel, shooting becomes mere chance work. Clark's patent loading muzzle—an American invention—has conferred a superiority for accuracy on all rifles furnished with it.

It is admitted that rapid loading is desirable, and that this is obtained with expanding bullets; but these are not reliable. But, then, are not accuracy and rapidity of firing combined in breech-loading rifles? The late Secretary of War, in his report, said: "I think it may be fairly asserted now that the highest efficiency of a body of men with firearms can only be secured by putting into their hands the best breech-loading firearms." This conclusion, it seems, was arrived at after a great number of experiments by army officers. There can be no question as to the ease and rapidity of loading breech-loading rifles, but they are not considered so accurate in firing as a good muzzle-loader. We have seen several trials of skill with the two kinds, in which the breech-loader usually failed; and yet we do not see why this should be considered a settled question. There is nothing in theory, and there should be no positive difficulty in practice, to prevent a breech-loading rifle from being made to carry as accurately as any other. We shall recur to this subject in a future article.

### THE NEW COMMISSIONER OF PATENTS.

The inquiry is frequently made of us, who is likely to be appointed Commissioner of Patents under the incoming administration? Our readers are deeply interested in this matter, and in view of the vast and increasing importance of the interests over which the Commissioner of Patents is called to preside, the inquiry is a pertinent one. We are not in the counsels of the acting President or President elect, and have therefore no authority to speak for them. This much, however, we will say, that the appointment of a Commissioner of Patents is an important matter, and it ought not to be conferred merely to provide a place for some windy

political demagogue, as a reward for stump services. Neither should the selection be made of one who has searched into the profound mysteries of some science and knows but little else. The duties devolving upon the head of the Patent Office are somewhat peculiar, and require "the right man for the right place." He must have considerable patience, a willing ear, and a firmness of purpose not to be wheedled out of the path of progress into old foggy notions. He must have not only a knowledge of law, but he ought also to be able readily to distinguish the difference between a cheese press and a hydraulic ram, and even, to go further, when necessary, to protect the rights of an inventor by overruling wrong decisions. His habits, conduct and language ought to be high-toned and above suspicion. In short, he ought to be a gentleman, possessed of good common sense, having a generous appreciation of the interests of inventors, so as to welcome them to the Patent Office in free and frank intercourse; and if an inventor should happen to suggest that his rights had not been fully respected, not to swear behind his back, nor consider it an attempt to cast odium upon a high public functionary. There are plenty of solid men in this stirring country, possessed of all the desirable qualities herein mentioned, and who would, doubtless, cheerfully accept the appointment if tendered them.

The only name we have heard suggested for this office is the Hon. Butler G. Noble, of Wisconsin. From what we know of this gentleman, we should think he has all the elements necessary to make an admirable Commissioner. He is a lawyer by profession, and has a knowledge of the arts and sciences surpassed by few men in the country, to say nothing of his capacity for work and his readiness to do his whole duty.

Mr. Thomas, who retired from the Patent Office to assume the duties of Secretary of the Treasury, has resigned his new office, and it is stated in the *Daily Times* that he would probably again resume the duties of Commissioner of Patents. This we consider wholly improbable under the circumstances. The duties of the Patent Office are now acceptably performed by Mr. Shugert, and we hope no one will be placed over him. We should be most happy to announce the determination of Mr. Shugert to abolish that useless appendage, the "revisory board," and inaugurate some other changes in the Office such as would relieve it from suspicion of imbecility at least.

### THE FERTILITY OF INVENTORS.

We published last week an illustration of the mode of spiking cannon, and it would surprise any one who has not come in actual contact with the inventive genius of the country, to learn the number of suggestions which have been made to us of improvements in this simple operation, both for spiking cannon and for restoring them again to usefulness. If the attention of our inventors is called to the need of any improvement, however difficult of accomplishment it may appear, it is surprising how promptly some means of effecting it will be devised. A few years since, an extensive worker of marble, in New Hampshire, offered, under special conditions, a reward of \$10,000 for a machine for sawing marble in a particular manner which it had been deemed impossible to effect by machinery, and the plans poured in upon him in such abundance, that he was not only embarrassed with scores of personal applications, but had so many letters upon the subject, that he was led to exclaim, "Hold, enough!"

Very many of the operations which are now regularly performed by machinery, would have been regarded, a few years ago, as absolutely beyond the power of mechanism. Who would have thought, for instance, that a peck of pins could be poured into a hopper, and that a machine would take them all by the heads and insert them in straight rows into papers, with a rapidity and regularity unapproachable by hand work? Here is a loom, driven by a powerful water wheel or steam engine, and running with great force, weaving with rapidity a very slender cotton thread into a web, and if the tender thread breaks, the loom instantly stops. A piston is moving back and forth in a steam-tight cast iron cylinder, and the varying pressure of the steam, throughout every portion of the stroke, upon each square inch of the inside of the cylinder, is accurately recorded by the engine itself upon a sheet of paper with a lead pencil. What man can pronounce any mechanical or scientific achievement