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NEW DESTRUCTIVE CANNON — SHELLPROOF VESSELS.

In the last number of the SCIENTIFIC AMERICAN, we gave a brief account of some experiments recently made in England with heavy rifled cannon upon a target composed of 10-inch iron plates. It was stated that, with an Armstrong gun firing 110 and 126-pound shots at 600 yards distance, the target of such thick iron plates was smashed to pieces as if it had been composed of pine planks. The result of these trials surprised us. They were altogether unexpected, because experiments had been made previously with Armstrong and Whitworth heavy cannon, firing 80 and 100-pound solid shot against 4½-inch iron plates, and these had ended in favor of the plates. As these famous guns had been popularly considered the most destructive known, it had come to be concluded almost a settled matter that iron plates of 4½ inches in thickness were effective safeguards to vessels under most circumstances of battle; hence the vast expenditures already incurred for building mail-clad vessels for the British, French and other navies.

We gave the account of those experiments as they had come to us; but what excited our surprise most, was that the Armstrong gun, under one set of experiments, should have been able to smash 10-inch iron plates to pieces with 110-pound shot, at 600 yards distance, while, in a previous set of experiments, it had not been able to break 4½-inch plates with 100-pound shot, at 400 yards distance. We have waited for some further light upon the subject; it has arrived, and is partly satisfactory. The London *Mechanics' Magazine* states that the new destructive effects upon the thick iron plates were not due to the Armstrong breech-loading cannon—the gun which was boasted to be the most destructive in the world—but to a new cannon constructed by Sir Wm. Armstrong upon an entirely different principle. A particular description of this cannon is not given; it is called a "shunt gun," without an explanation of the term, excepting that, instead of loading it at the breech, it is loaded at the muzzle. From the very general description given of it, we think it is a common rifled cannon, in which winged conical shot fitting the grooves is used—in principle, a copy of the French cannon.

It is also stated that before the new Armstrong gun was tried upon this target of thick plates, heavy shot from powerful smooth-bored cannon had been fired at it for several days without producing the least injurious effect. It is generally considered (although the reasons for such opinions are not very sound) that by doubling the thickness of iron plates, four times the resisting strength is obtained. Therefore, if plates of 4½ inches in thickness were capable of successfully resisting 100-pound shot, 9-inch plates should have been capable of resisting 400-pound shot having the same velocity. Such ideas are now untenable. These experiments teach us that military mechanical engineering is in a very unsettled and imperfect condition. The most destructive weapon of war this week may be rendered obsolete the next week by some new improvement.

An important question now arises respecting the efficiency of iron-clad ships of war. It may be said: What is the use of covering vessels with iron plates of four and five inches in thickness, when 10-inch iron plates are unable to resist heavy solid shot? We have always advocated the use of iron-clad vessels as a safeguard against shells, not against solid shot, and we are convinced that 3-inch plates of the best American Salisbury iron, or tough semi-steel, would resist shells, and these are more destructive missiles than solid shot. And if other nations, such as France and England, have adopted iron-clad frigates, it is necessary that our navy should also be provided with several such vessels to be on something like equal terms with them, for no timber vessel in our navy could stand fifteen minutes' in close action with *La Gloire* or the *Black Prince*.

We also still hesitate to accept in full the statements hitherto published about the breaking of the 10-inch plates. The metal was perhaps poor in quality, or perhaps the plates were not properly fastened. We know that there is just as great a difference in the toughness of various qualities of iron as there is in timber—between basswood and hickory; and the 10-inch plates may have been composed of very inferior iron.

In order to obtain shellproof gunboats of light draught, and, at the same time, obviate the necessity of employing thick and heavy iron plates for sheathing, a combination bombproof outer coating may be used, consisting of 2-inch tough iron plates and an inside packing of prepared cotton.

Mr. J. Chapman states, in his work on the improved American rifle, that at 40 rods distance, with a charge and rifle which sent a picket bullet into three inches of seasoned hemlock, he filled a box 16 inches in depth with cotton-batten, covered its open end with a piece of sheepskin, and fired a number of shots into it, when, contrary to expectation, they penetrated only 10 inches, and their form was "more marred" than if they had been shot into sand. By steeping cotton in a preparation of alum, or phosphate of ammonia, it may be rendered fireproof, so as to make it safe against red-hot shot. With iron plates of two or three inches in thickness to break shells, and a packing of prepared cotton to resist the penetration of solid shot and prevent the spreading of splinters, shellproof gunboats of very light draught may be constructed.

CONDITION OF THE PATENT OFFICE.

The affairs of the Patent Office are moving forward with great regularity and to the satisfaction of its friends. Commissioner Holloway is fully alive to all the duties of his office, and is giving abundant evidence of his interest in the inventor's welfare. It is much to his credit that he is gradually breaking up a *clique* that has long enough exercised a pernicious influence in and about the office, and we are assured that the Chief Clerk, Mr. Hayes, is ready also to sustain the Commissioner in every laudable reform. A number of important removals has been made, and still the work is not yet done. We hope Mr. Holloway will stand his ground and firmly resist the encroachments of all those subtle influences such as enveloped his predecessor. The breaking up of that nonsensical "Board of Revision"—the special pet of Mr. Thomas,—and the recent important change in the mode of examining interference cases, are among the beneficial acts of the new administration.

We say most emphatically, that the present condition of the office is about all that inventors can desire. The coils about the office have been broken—the enemies of a fair and open discharge of its duties are now temporarily discomfited. Let Mr. Holloway and Mr. Hayes see to it that these enemies be kept at bay for the future.

GENERAL BUTLER.

General Butler has under his command some 15,000 men, costing the nation at least $40,000 a day; and the community have been asking why it is that this army is permitted to lie, week after week, at Fortress Monroe in idleness? It now appears that this is no fault of the General's, but that he has been urgently demanding of the government the necessary means to enable him to make a successful advance.

The air is full of rumors that the managers of our military operations are dallying with this rebellion, either with an idea of patching up a disgraceful and short-lived peace, or for the sake of feathering the nests of favorites, or from schemes connected with their own personal ambition. As a part of these rumors, it is whispered that the Cabinet are hampering the movements of General Butler, from jealousy of his rapidly rising popularity, and from fear that the eclat of his military achievements may eclipse their reputations.

Knowing on what slight foundations rumors may be raised, we generally attach to them very little weight indeed, and notwithstanding the positiveness with which the assertions above alluded to are made we trust that they are entirely groundless. We have entire confidence in the honesty of the President, and we cannot believe that any American who has sufficient character to obtain office could be guilty of the awful crime of trifling with the lives of our soldiers and with the fate of the country in this crisis.

If any man who has been intrusted with great power by the nation *is* using that power for his own selfish purposes, we advise him to be very careful not to be found out. The public mind is in an unusually earnest and determined temper, and if a public officer should now be detected in any of these wicked schemes, "it were better for him that a millstone were hanged about his neck, and that he were drowned in the depths of the sea."

ARMY RIFLES.

For many years, the leading nations of the world, when they quarreled, were content to fight their battles and struggle for victory without paying much attention to the character of their implements of destruction. Their generals trusted more to the discipline of the soldiers and their courage, than to their weapons of offence and defence. These days are gone for ever, and military men everywhere are intently bent upon obtaining the most improved implements of warfare. Within twenty years a great revolution has taken place in the equipments of all armies. The old smooth-bored muskets, that were then considered almost perfect, are now being placed in museums, as curious relics of a more unenlightened age—companions of the bow and arrow. This is the case not only with small arms, but is true also of the large engines of war, for field, fort and frigate.

The leading feature of this revolution in implements of warfare, is the substitution of rifles for smooth-bored firearms and cannon. It is not a little remarkable that no new essential principle in the construction of these arms has been discovered; nay, more than this, their advantages were known and pointed out by Robbins, a writer on gunnery, nearly a century ago, but until quite recently their merits were not generally appreciated. It is only within six years that the rifle has been adopted generally for the British army, and less than this for the American army, and yet in 1848, Mr. Chapman advised the arming of soldiers with improved rifles, and the training of them to shoot at ranges from 250 to 1000 yards. His views are now being acted upon in all armies.

It is well known that a rifle is at least four times more accurate than a smooth-bored piece, and its range at least twice as great. Its advantages, therefore, are obvious. But there is great room for improvement in army rifles. Military mechanical engineering is in a transition state at present; great and obvious defects have to be remedied, for there is a great variety of rifled firearms, and there is a great difference in their quality. One very obvious defect in the common musket rifle—American and Enfield—is the great size of bore and the heavy bullet and charge required for it. Thus the bore is .580 of an inch, taking a conical bullet of about an ounce in weight, and a charge of powder in proportion. Now it is well known that target rifles having a bore of $\frac{5}{16}$ of an inch have as great a range, and are equally as accurate, as the large rifles, and are equally as destructive. Why not then adopt army rifles with smaller bore? A light long rifled barrel, with a large bore, is generally held to be necessary for bayonet exercise, but we believe that rifle barrels may be made thicker, and the bore much reduced, with advantage to the soldier. Thus with the smaller bored rifles a soldier could carry three times the number of cartridges in his box, and a great saving of ammunition, combined with greater efficiency, would thus be secured. This is a subject worthy of consideration by all military men, because the army which has the most efficient weapons of war, at the present day, is sure to be victorious in any encounter.