ARMOR PLATES AND ORDNANCE.

In the middle of the famous story of the guns, when every piece of practical experience was in request, we took occasion to remark upon the unfortunate imperfection of the evidence obtained from America. In that country new iron-clads were pitted against new artillery week after week, and if we could have got absolute information of the quality of the armor, and an exact account of the character and position of the guns, we could have instituted very serviceable comparisons between the British and American systems of artillery. Unluckily, however, these materials were never furnished, and the omission was the more to be regretted on account of the wide difference between the theories actually accepted in the two countries. The Dahlgren gun, which is the gun most in use in America, is constructed on the principle of preferring weight to velocity. It projects, with comparatively small velocity, exceedingly heavy balls, whereas the ordnance approved in this country possessed greater penetrative power, but carried, until recently, lighter projectiles. We were repeatedly assured by certain parties to the controversy that the Americans were ahead of us in these matters, and the action between the *Kearsarge* and the *Alabama*, in which the former destroyed her adversary with her 150-pounder Dahlgrens. was appealed to as almost decisive of the question. But we have now attained he one thing that was formerly wanting—a trial of this ordnance under known conditions and on a large scale. A strong iron-clad ship, the construction and armament of which are exactly known, engaged a squadron of vessels of which the armaments are known also; and this action in Mobile Bay, now illustrated not only by a Confederate version of the story, but by a special report upon the condition of the captured iron-clad, will enable us to measure with the requisite accuracy the relative efficiency of American artillery. We will first describe with precision the conditions of the trial—that is to say, the strength of the target or armor-plating on one side, and the number and the caliber of the guns on the other.

The *Tennessee* was a fine steam-propelled iron-clad ram, 200 feet in length, and 48 feet 6 inches in breadth. She carried 6-inch and 7-inch rifled guns; but of her aggressive powers we need not speak, as we are concerned at present with her powers of resistance only. Her defences, then, consisted of a wooden framework some 23-inch thick in the aggregate, and covered with five, or, over certain portions, with six inches of armor. This armor was composed of plates—or, as we should rather term them, bars—of iron, about 6 inches in width, and varying in thickness from two inches to one. Three layers of the thicker bars gave 6 inches of ironwork; two of these and one of the thinner gave 5 inches. It is said that at certain points of the greatest exposure the wooden backing received an additional thickness; but, at any rate, in its strongest part the armor of the *Tennessee* consisted of some 30 inches of wood, and 6 inches of iron, and no more. Now, when we recollect that this iron-plating was not solid throughout, but formed by successive layers, and that the whole fabric must necessarily have been constructed under many disadvantages, we may very confidently conclude that the target presented by the sides of the *Tennessee* to the Federal guns was certainly not stronger than those which have been employed in our experiments at Shoeburyness. It is hardly credible that the Confederates could have procured iron of such a quality as our own fastidiousness demands, and we have long ago assumed it as unquestionable that laminated armor is far inferior to solid plating. We should observe that the casements of the *Tennessee* were inclined at an angle of 45 degrees, but that condition, as far as our trials have taught us, would not materially affect the issue. Such, then, was the target; no stronger, to say the least, than those used by ourselves. Let us now see what was the strength of the artillery brought against us.

Admiral Farragut took into action fourteen wooden men-of-war and four monitors, and with seventeen of these vessels he engaged the *Tennessee* alone for upwards of an hour, one of his monitors having been blown to pieces by a torpedo, and the small gunboats of the Confederates being quickly dispersed. This squadron carried altogether nearly 200 guns, of the best quality and largest calibre known to the American service. In the broadsides of the sloops there were eighteen 100 pounder Parrott guns and 126 9-inch Dahlgrens. In the turrets of the four monitors there were six 11-inch and four 15-inch Dahlgrens, the latter throwing a shot of 450 pounds weight. In the gunboats there were no pieces smaller than 100 pounder Parrotts and 11-inch or 9-inch Dahlgrens. It thus appears that every variety of American ordnance was here represented, and that the most powerful guns used in the Federal service were employed in the engagement. To show also the completeness of the experiment, we may add that the *Tennessee* was pounded as fairly and as deliberately as any actual target in artillery practice—in fact, under conditions to which no target in a real experiment would ever have been exposed. The batteries of the Federal vessels were brought to bear upon her at a range, not of 200 yards, but of ten feet, and towards the close of the action she became so far disabled by an injury to her rudder chains that the attacking vessels could choose their own positions and cannonade her with perfect impunity.

Now, what should we have thought, on the face of the case, would be the result of such an engagement? We should have concluded, beyond all question, that the *Tennessee* would have been sent to the bottom in ten minutes; that she could never resist such pounding from such batteries; and that a far smaller number of guns, of less caliber, would have been sufficient to dispose of her under such conditions. In fact, if the first broadside of 9-inch solid shot delivered from the Federal flagship at ten feet distance had sunk her on the spot we should not have been much surprised. But at what did really happen we are surprised in the extreme. All this prodigious array of artillery, these monstrous cannon, and these ponderous balls, proved practically ineffective against the wood and iron of the *Tennessee*. The target beat the guns hollow. The heavy Dahlgrens simply produced indentations on the iron bars of the ram.

The Parrott guns did no better. Solid shot from the sloops, steel shot from the rifled pieces of the gunboats, and shells from the monitors were poured upon the target at close quarters, for an hour together, without producing much more effect than so many pistol bullets. We are especially told that the gunnery practice was excellent, that the Federal sailors never lost a chance, and that they planted their shots just where they were most likely to tell. But we also know, and from Federal as well as Confederate sources, that the *Tennessee* proved practically impregnable through all this storm of projectiles. It is admitted that the ship when finally captured, under circumstances which we have already related, was substantially uninjured. One 450 lb. ball had pierced the armor, and started a portion of the wooden backing, but had not actually entered the ship, and that was the nearest approach to penetration.

We must now invite the public to draw a conclusion from this extraordinary trial. Of two things—either the armor of the *Tennessee* was superior to any of the targets which represent our iron-clads, or the ordnance of the Federals is inferior to our artillery. We have already said that we do not think the former hypothesis could be maintained for a moment; and, consequently, we must close with the latter. This we do without hesitation, and we imagine that most persons acquainted with the subject would be prepared to affirm that the guns which penetrated the *Warrior* target would, at 10 feet distance, have smashed in the sides of the *Tennessee* before the action had lasted a quarter of an hour.—*London Times.*

A New Great Gun.

The London *Times* makes the following announcement of a new invention of heavy ordnance:—

"A gun, we believe of entirely novel construction, has been invented and patented by Major-General Hutchinson, commanding in the west of England, and if the expectations of the inventor be only partially realized, great changes will take place in the construction of much of our ordnance. The objects sought to be accomplished in the new gun are—first, that it shall weigh little more than twenty times instead of upwards of eight hundred times the weight of the shot, as is usual; second, that without friction it shall impart rapid rotation to the shot; third, that the shot shall be of the form best adapted for penetrating the air and target; and, lastly, that it shall leave no vacuum behind it, and not ricochet when it strikes the water. A few experiments have been made at Plymouth. The last took place on the 28th ultimo, on board the gunner-ship *Cambridge*, Capt. J. F. Ewart, in Hamoaze.

"The gun is somewhat like a lengthened mortar. The chamber is of the usual cylindrical form, but only sufficiently long to hold the powder and wadding. It is at the mouth that the chief peculiarity occurs. The shot is termed disc shot. Those used last week were about the size of two very small plates placed against each other, excepting that the edge is sharp. The muzzle of the gun is much enlarged, and is formed so as to receive with great exactness the inner half of the disc shot. The more accurate the fitting is the less the escape of gas and the truer the aim that can be taken. When in place the outer edge of the shot is flush with the muzzle of the gun. The shots weighed 4 lb. 2 oz. The charge of powder, 6 oz., being 1-11th part of the weight of the shot, whereas the usual proportion is about one fourth the weight of the shot. The gun was of nearly 200 lbs. weight, double, the inventor said, what it ought to have been. The first trial was at the 1,000 yards' target. The shot went in a good direction, and pitched 100 yards beyond the mark. The other two experiments were at 13 degrees elevation for range, and 4 degrees for aim. In neither case could the position of the shot, when they fell, be observed. The tide was out, and doubtless on striking they, from their rotation, buried themselves in the mud.

"The experiments, as far as they went, were considered satisfactory. When in the gun the shot stands in a vertical position, and rotation is causedf by the axis of the chamber lying above the center of the shot, and by a small projection in the interior of the muzzle, at the bottom, meeting the edge of the shot. From the shortness of the gun it possesses all the advantages of a breech-loader, and from the simplicity of its construction and the little metal used it promises to be both a cheap and easily-handled weapon. The projector may be too sanguine, but he avers that one weighing no more than the ordinary 66-pounder will discharge a 600 lbs. disc. The carriage is fitted with a number of galvanized india-rubber cylindrical buffers (in contact by their sides, not extremities) placed in grooves on the flanks of the gun; these received the recoil. By a simple mechanical arrangement the rebound was received in a similar manner on a series of rings fixed below the gun. This disposition of india-rubber rings the inventor prefers to any compressors, as they do not make the gun 'jump,' to use the technical expression."

[This is another exhibition of the London *Times's* mechanical science. If the writer had opened any ordnance manual he would have found that the usual proportion of the weight of the gun to that of the shot is 100 times, instead of 800. This proportion is fixed by the first law of mechanics, "action and reaction are equal." If Major-General Hutchinson tries a gun only 20 times as heavy as the shot, he had better not stand behind it when it is discharged.

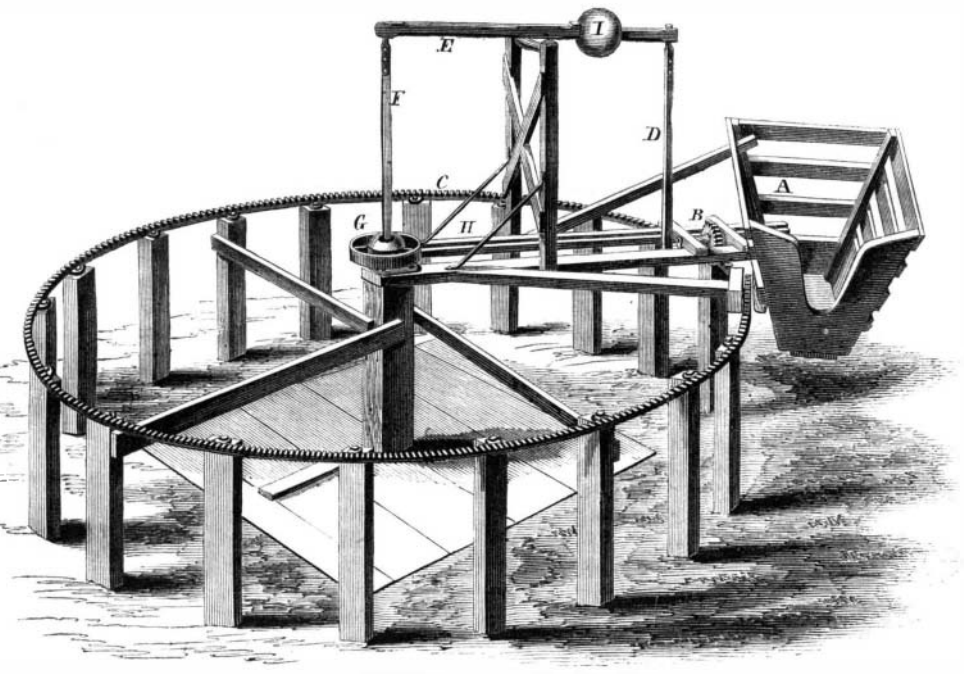
The idea of a disc shot to be fired in this way is certainly novel, but as the first movement of the shot would open a free passage for the escape of the gases, the pressure could be but momentary, and no considerable velocity could be obtained. In firing "at 13 degrees elevation for range, and 4 degrees for aim," it was a shrewd plan to fire into the mud, so that it could not be seen where the shot struck; then the experiments could be pronounced by the great "Thunderer" satisfactory.—EDS.

A 13-INCH PLATE.—Messrs. John Brown & Co., of the Atlas Works, Sheffield, have succeeded in rolling an iron plate, six feet by seven feet, and thirteen and a half inches thick. The idea of manufacturing so enormous a plate originated, we believe, with Captain Inglis, of the Royal Engineers, with a view of ascertaining if it would be desirable to protect casemates with such a powerful covering. The plate has been forwarded to Shoeburyness, where it will be exposed to a very trying test.

THE English 13½-inch gun costs $20,000. Four of them are now making at Elswick.

Improved Cattle Pump.

The inventor of this pump has started on a good principle. Instead of making man subservient to the beast, the beast is made to wait upon himself, and, like the trained canary birds in cages, draw its own water as it is required. In many places water for stock can only be had by pumping it from wells, and in such localities the arrangement herewith illustrated would be an extremely useful one. The machine is not at all complicated and is adapted to the comprehension or operation of the most stupid ox, the said ox having merely to travel round in a circle as a tread-mill is worked. The beast—horse, cow or any other animal—puts its head into the yoke-box, A. It then travels round, pushing the box before it. This act causes the pinion, E, to revolve in the circular rack, C. On the end of the pinion shaft is a crank which connects to a rod D, which in turn works the pump brake, E, and plunger rod, F. The water thus raised falls into a cast-iron dish, G, and from thence runs down the trough, H, which moves when the box does, and conveys the water to the animal, so that when it has pumped enough to supply its wants it ceases and goes away, not being willing, doubtless to pump water for its comrades. In this way no water is wasted and no labor other than of the animal is required. The ball, I, is intended as a counterbalance to the column of water raised when the well is deep. There is no difficulty in teaching animals to draw their own water in this way; in a short time they will go to it as naturally as they do to the stack for fodder.

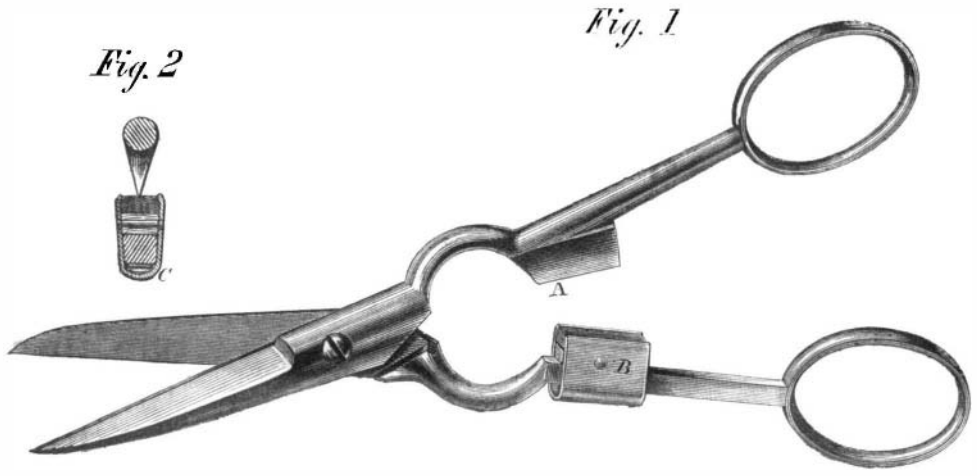


DICKSON'S CATTLE PUMP.

Patented through the Scientific American Patent Agency, by Jos. A. Dickson, of Sandwich, Ill., on the 20th of Sept,. 1864. For further information address him at that place.

Improved Button-hole Cutter.

This attachment to a pair of scissors is intended principally for cutting button-hole slits, for which purpose it will be found very convenient. It can also be employed for snipping off thread, or the miscellaneous uses which seamstresses or tailors, have for such an instrument. The invention consists in forming a cutting blade, A, on the shank of one leg of the scissors and affixing a bed, B, which has a surface of raw-hide, vulcanized rubber, wood, or any tough resisting material, to the other shank, so that it can be moved up and down. This bed is held in place, when used, by a spring, C, inside (see Fig. 2), but which yields when pressure is applied to the end so as to slide it up and down. In other respects these scissors are not peculiar. This is a very useful article, and one that will save much time in handling other tools generally used to effect the same object. It was patented Oct. 4, 1864, by Francis G. Sanborn, of Andover, Mass. For further information address the inventor as above.



SANBORN'S BUTTON-HOLE CUTTER.

Improved Mining Machinery.

It is proposed in England to dispense with ropes and chains in mining machinery and to use the pneumatic elevator. A cylinder or tube is placed in the shaft, which rises a few feet above the top, and reaches a few feet below the bottom of the mine. In this cylinder or tube a double-headed piston works, and between the two heads of the piston a fixed or movable receiver or barrel, or wagon is placed, which holds the mineral or water to be raised. An air-pump, worked by steam engine or water-wheel, or other power, is used for forcing air down the shaft in a tube, which air passes into the cylinder below the under piston-head. When the load is put in at the bottom, a valve is opened, so that the air is introduced under the piston, which with its load, then rises to the top. On arriving at the top the load is removed, and on an escape-valve at the bottom being opened, the piston descends, and the air which escapes ventilates the mine.

English and Swedish Iron.

The difference between plate iron made respectively in England, France, and Sweden, has been thoroughly tested at the fortress of Calberg, Sweden. There were two French plates, each 7 feet 6 inches by 2 feet 3 inches, and one 6 feet by 3 feet 8 inches. All the plates were 4½ inches thick, and then bolted to a teak target backed with iron plating, and supported by a massive stone pier. The two upper plates in the target were French, each secured by 11 bolts; the next plate below was the longest, Swedish, secured by 29 bolts. Below this was a tier of two short plates, one Swedish and one English, each secured by 24 bolts, and the lowest plate was a long English, secured by 29 bolts. Each plate received six shots from the ordinary 68-pounder naval gun. The French and Swedish plates broke to pieces, and the English plates remained uninjured and free from cracks. The shots used were of Swedish iron.

Terrible Tornado in Illinois.

A correspondent of the Chicago *Tribune*, writing from Mattoon, Ill., Sept. 24, says:—"A terrific tornado passed over this section of the State yesterday, at about five o'clock, P. M. Its approach was heralded by a dense black cloud rising rapidly in the west, and rushing with fearful velocity over the prairie nearly due east, accompanied by tremendous discharges of electricity, which fairly shook the earth like an earthquake. It struck the Central Railroad track at Mattoon, unroofing and blowing down buildings and carrying away every movable thing in its path, but most fortunately and incomprehensibly inflicting no serious injury upon any one. A loaded freight train on the Illinois Central Railroad, going north, was lifted bodily and turned over beside and across the track. Some of the cars were smashed to splinters, while others were merely unroofed and the freight little injured. One car was carried half a mile. Bales of cotton, hogsheads of tobacco, barrels of flour and fragments of the cars were strewn over a large extent on either side of the track. The clearing of the ruins occupied the whole night, and the trains were detained. Singularly no one was hurt on this train, which was so completely demolished. This section of the State has always been subject to these terrible visitations. It is a vast expanse of prairie, presenting no resistance to the circumlocutive force of the atmosphere in motion. It will always be subject to such accidents till the prairies are planted with forests—a measure alike conducive to safety, beauty, and the material interests of the country."

Omelet.

Beat together four eggs and one cup of sweet milk. Have ready a skillet with a piece of butter the size of a walnut on a moderate fire. When the eggs are beaten, place them in a skillet and cook ten or fifteen minutes. [A capital addition to the above is par-boiled ham cut into small bits and mixed with the omelet when placed in the skillet.]—*American Agriculturist.*

[This mixture may not inappropriately be called egg leather, for cooked in this way it cannot fail to be tough, flabby, and indigestible. The proper way to make an omelet is to take three teaspoonsful of milk for each egg, and a pinch of salt to each one also. Beat the eggs lightly for three or four minutes, and pour them into a hot pan in which a piece of butter the size of a walnut has been melted a moment before. The mass will begin to bubble and rise in flakes immediately, and the bottom mast be lifted incessantly with a clean knife so that the softer parts run in. An omelet should be cooked about three or four minutes, and made in this way will melt in the mouth.—Eds.

California Silk.—It is said that the silk grown in California is even better than European, the fertility of the soil and the dryness of the atmosphere favoring the growth of the mulberry, and giving a more delicate quality to the fabric.