

flashed out, and, by its reaction, threw the shell out of the tube. It was an attempt to use steam as a substitute for gunpowder in shells, and was a failure. The centrifugal gun of Robert McCarty, of this city, which has been tried two or three times recently at the foot of Thirty third street, North river, was patented as far back as December 31, 1838. It is essentially composed of a hollow revolving wheel, which discharges its balls through a tube at the periphery by centrifugal action. By applying a steam engine to drive the wheel of this gun, instead of two men working cranks, we really have the Baltimore gun in its most essential features.

On the 21st of December, 1854, A. Smith, D. McKenzie and James Thompson, of England, took out a patent for discharging bullets from a gun by using very high pressure steam as a substitute for powder. The steam was contained in a very strong, small boiler, and was admitted and cut off by a valve to discharge the shot in the same manner that steam is admitted behind a piston in an engine. The boiler was surrounded by a bath of molten metal heated to 1,100° Fah. This was a true, but a very foolish steam gun.

An anecdote is told of the Duke of Wellington to the effect that, after having examined Perkins' steam gun with great attention, and having asked a number of pertinent questions relating to its weight, the means of moving it, getting up steam, &c., he dryly observed, "Well, if steam guns had been invented first what a capital improvement gunpowder would have been." We do not consider that the Duke of Wellington's opinions were infallible respecting inventions, or that he was a man of what may be called "brilliant intellect," but he had a vast fund of plain common sense, and the multitudinous appendages of the steam gun convinced him that it was unfit for the purposes of war. A steam gun could throw a stream of bullets upon the advancing head of a storming column, but with four guns in battery a perfect stream of canister may also be thrown upon an attacking party and produce more destructive results.

BATTERY OF WHITWORTH CANNON ARRIVED.

A number of loyal American citizens in England have made a present to the government of a battery consisting of four of the celebrated Whitworth wrought-iron rifled 12-pounders. One of these was exhibited to the public on the 3d ult., in front of the City Hall, where it attracted a large crowd of spectators, ourselves, among the number, who examined it. This gun is a breech-loader, and its bore is rifled, with hexagonal grooves, having a turn in thirty-six inches. The length of the gun is 9 feet; the bore $3\frac{1}{4}$ th of an inch in diameter; the bullet used is of cast iron, $9\frac{1}{2}$ inches long, and in form is an elongated oval. At the middle or thickest part it is formed with long ridges to fit the grooves of the gun and prevent windage. The metal of this cannon is thin, but strong; and the workmanship appears to be good. This was to be expected, as the inventor is the most distinguished tool-maker in Europe, and he was the Commissioner on Machinery appointed by the British government to the World's Fair at New York, in 1853.

The breech of this rifled cannon is a steel screw cap—it has no wedge-plug like the Armstrong gun. A lever, like that of a vise, is attached to the outside of the breech, and three turns unscrew it. A hoop supports the cap, and it is swung back a little to the one side, like a door, leaving the breech open to receive the winged shot and cartridge. A tin spiral cartridge case receives the charge of powder inclosed in a wad lubricated with a composition of wax and tallow. The breech is now swung forward, screwed on, a friction fuse placed in the vent-hole, and it is ready for firing. The loading can be executed rapidly, and the tin cartridge case prevents all leakage at the breech. This case is not discharged, but remains in the breech-chamber, and is drawn out when a new charge is to be put in.

It has been stated that the Whitworth cannon has surpassed that of the Armstrong gun in range and accuracy. Two 3-pounders and one 12-pounder, similar to the one on exhibition, were tried on the sea beach near Liverpool in the spring of 1860, when the small guns threw shot $5\frac{1}{2}$ miles with an elevation of 7°, and the 12-pounders at an elevation of 5° had a range of 2,754 yards, with a charge of $1\frac{1}{2}$ lbs. of pow-

der. With this range, the average distance of ten shots from the center of the target was one yard. The range at 7° elevation was over five miles. We think these guns will carry accurately at long ranges, because great care appears to have been bestowed upon the bore, grooves and muzzle.

Accurate shooting cannot be executed with a foul gun; it must be kept perfectly clean in the inside or it will not give satisfaction. It has been stated that one of these guns has sent a shot through a $4\frac{1}{2}$ -inch plate of iron. By using lead bands on the elongated shot they do not require to be cast with wings.

The *Army and Navy Gazette* of England says that notice has been received at Portsmouth that a 200-pounder Armstrong gun will soon be sent there for experiments against iron plates, and application has been made for new 4-inch and 5-inch plates for the sides of the *Sirius*. The Iron Plate Committee, of which Lieutenant-Colonel Henderson, R.A., is president, have been carrying on experiments on penetration at Shoeburyness. It may be interesting to know that, in the late visit of the Duke of Cambridge to Shoeburyness the Whitworth and Armstrong field pieces were matched for time against each other, when the former fired 20 rounds in 20 minutes 16 seconds, and the latter did the same in 15 minutes 7 seconds. The practice was at 1,000 yards' range, and was of first-rate quality from both guns; but the Armstrong, in the form of the breech and the manner of closing up, would appear to have an undoubted advantage. A 300-pounder gun, on the Armstrong principle, is in course of manufacture.

HIGH PRESSURE STEAM IN CONDENSING ENGINES.

The London *Engineer* publishes some extraordinary information on this subject. It states that Mr. L. Perkins, of London, has for several months past been working an engine at pressures of 350 lbs. on the square inch, expanding it down twelvefold, and then condensing it. The engine used has three single acting cylinders, the piston rods of which are connected to a single cross-head. The first cylinder in which the steam is admitted receives it at a pressure varying from 250 lbs. up to 600 lbs. per square inch. The cylinder is 6 inches bore, the metal $1\frac{1}{2}$ inches thick. From this cylinder the steam, which is partially expanded, is exhausted into a 14-inch cylinder, and from this into the third cylinder of the same size. The steam acts upon the lower side of the small piston, also upon the same side of the second one, but upon the upper side of the third piston. The exhaust steam is conducted into a surface condenser at a pressure varying from 10 to 20 lbs. The total indicated power of this engine is 60-horse power, with a consumption of only 70 lbs. of coal per hour.

Mr. Perkins is the son of Jacob Perkins, the distinguished American inventor who first experimented with steam guns, and used steam at a pressure of 1,000 lbs. There can be no question about the economy in fuel resulting from high pressure steam expanded several times, when the cylinder is well protected, and the steam slightly superheated, but very high pressure boilers are dangerous. We scarcely ever hear of the explosion of a low pressure boiler, but explosions of high pressure boilers are too common. Safety first, and saving of fuel second, should be the rule in steam engineering.

CONTRACTORS LOOK OUT.—The evil of selling out contracts to third parties at a large bonus, is quite seriously felt, but the Assistant Commissary General, Col. Welch, is determined to put a stop to this as far as possible, and, with the aid of Inspector Rich, is succeeding quite fairly. A day or two ago 750 axes were brought to the Arsenal, in this city, by a subcontractor, which did not contain a particle of steel. Col. Welch immediately rejected them, and purchased others at the expense of the contractor, who, by this operation, will be several hundred dollars out of pocket. A man who would thus be guilty of defrauding the government in times like these, would rob a hen roost. Let the honest indignation of the people frown upon such scamps. They almost deserve a coat of tar and feathers, but our people are not accustomed to this enlightened practice.

SHARP'S RIFLES.—The Hartford (Conn.) *Courant* states that the manufactory of Sharp's rifles in that place is to supply government orders.

WOODEN-SOLED SHOES FOR SOLDIERS.

A well managed commissariat is to an army what a good boiler is to a steam engine. An army may be large, well disciplined and brave; but it will prove very inefficient, and will ultimately become disorganized, if the men are not properly fed and clothed. Perhaps no department of the commissariat receives such improper attention as that which relates to furnishing the soldiers with shoes. We learn from our Philadelphia cotemporaries that gross frauds have been perpetrated upon volunteers in Pennsylvania, in the wretched shoes which have been provided, and loud have been the complaints against them. It is a false economy to purchase cheap and poor shoes for an army; they should be made in the best manner and of the best materials. But it is a question of great importance to ascertain what kind of shoes are the best for an army. For quick movements and rapid marching, shoes made with strong leather uppers and thick hemlock-tanned soles are, perhaps, the best, all things considered. But every soldier should have two pairs of shoes, and for various duties the wooden soled shoes manufactured by McClallan & Son, of Chicopee, Mass., are the most suitable which can be provided, as one of the two pairs.

We stated on page 10 of the present volume of the *SCIENTIFIC AMERICAN*, that numbers of the French soldiers, when in the Crimea, wore wooden shoes during winter, and they suffered less from sickness than those who wore shoes of leather. The reason of this is evident, and it should afford a lesson to all military authorities. The wooden sole is an excellent non-conductor, therefore such shoes keep the feet dry and warm in wet weather, or when the soldiers are working in the trenches, or when exposed upon guard during damp weather. It is well known that when the feet are kept warm, the body partakes of the same comfort, and *vice versa*. The condition of the soldier's feet has a most important influence upon the health of an army, as by keeping them dry and comfortable, chills and fever, and dysentery—the common attendants of camp and field life—are to a considerable extent prevented. These reasons principally induce us to recommend the improved wooden soled shoes for soldiers in our army.

Another reason has also weight with us in this recommendation. These shoes are cheaper and more durable than most of the leather shoes that are manufactured, and they are therefore more economical for soldiers. And beside this, as they are made under the authority of one company, every shoe furnished can be traced to a responsible source, and this will always insure a supply of good articles. These shoes also possess the advantage of being very easily mended by any soldier. If the outer sole is worn down, piece of leather can be put on in a few seconds with four screws, then filled with tacks.

OUR SOLDIERS.—It pleases many secession journals to employ language toward our soldiers of the vilest character. Now, if this sort of warfare could gain a single victory or confer the slightest possible advantage upon the armies of the Confederate States, there might be some excuse for it as a species of low tactics; but all the Billingsgate of the secession press will not degrade the character of the Federal troops. They will be just as brave and just as determined to win the victory as ever, and if Southern troops expect to see them take to their heels and run at the first sight of a secession host, they will commit a blunder. No American need feel ashamed of the soldiers of the Union. So far as we have watched their departure for the seat of war, we are prepared to say that a nobler set of men never rallied to the support of a government.

COL. FREMONT, whose name is so well known throughout the world, has received the appointment of Major-General in the army of the United States, and is expected to return home from Europe at once and will bring with him ten thousand rifles and a park of rifled artillery, consisting of forty 12-pound guns.

A VERY curious pleasure boat, built for the French Emperor, now lies at Asniers—a complete imitation of the *triremes* of the Roman period. It is about 80 feet long, with three ranges of oars, one above the other; its high prow and stern give it a very picturesque appearance.

Secession in Tennessee.

It seems as though the truth could not serve the purposes of the secessionists. They are a shrewd and unscrupulous set, and have thus far worked out their diabolical schemes in a bluff and reckless manner, and have hoodwinked seemingly good men into their snares. One of the most lamentable examples is now before us in the address issued to the people of Tennessee by the editors of the secular and religious press of Nashville. It was written undoubtedly by a secession editor, and abounds in all those flimsy tales of imaginary wrongs which have made up the whole stock in trade of these conspirators against the government, and no doubt religious editors have been either gulled or frightened into their support, for we can hardly believe that a professed religious teacher could be guilty of such monstrous misrepresentations. We have no room to publish the entire address, but a whole extract will show the web and woof of the whole fabrication. These Christian editors say:—“Powerful armies of fanatics and plunderers are to be quartered in our quiet cities and towns in the South, dictating laws to us at the point of the bayonet, and the slaves are to be turned loose with more than savage atrocity on helpless women and children.”

If there be one editor at the North, be he political, scientific or religious, who is afraid to denounce this infamous system of deception upon a brave people, such as the State of Tennessee contains, he is a fit subject to privateer under Jeff. Davis' piratical letters of marque. The whole conduct of the government thus far is a refutation of the address of these pious editors at Nashville, and if they will but turn and read Major-General McClellan's address to the people of Western Virginia, on another page, and not blush for their treacherous conduct to the people of Tennessee, then we shall regard their case as hopeless. The war of the Revolution, which gave us our liberty, was not waged by such unholy weapons as are forged by the Confederates. Washington succeeded by no such ignoble supporters.

The Weapons of this War.

The editor of *Wiles' (N. Y.) Spirit of the Times* is a soldier, and now in Washington. In a late letter to his paper, he thus remarks on the weapons with which the battles are likely to be won:—

Some importance has been attributed to the fact that the Southern men, as a general thing, are better marksmen than the soldiers of the North, and that they will consequently possess a great advantage, through such superiority, in the hour of battle. But while I do not believe that this is the case to any great extent, I would not, even if it were so, give much consideration to the fact; for in battle but few special shots are made, and the coming struggle is not destined to be a contest of mere marksmanship or evolution.

War began with the spear for its weapon; after a variety of changes, through several centuries, it yielded its refinements, and under Napoleon III., on the fields of Magenta and Solferino, came back to the spear again. On those bloody and bitterly-contested fields, the alert Zouaves and the athletic Chasseurs d'Afrique refused to accept the rations of powder and ball when served out to the troops just previous to battle; nay, when the charge was given, even refused to discharge the loads which were already in their weapons, but, rushing forward through the fire, they engaged the Austrians hand to hand, and bayoneted them in the ranks. This is unquestionably the true resource of superior physical condition.

On this plan the coming war between the North and South will surely be contested; and in part evidence thereof, I merely point to the fact that the government has already taken away the little costly breech-loading toys which the munificence of New York put in the hands of Colonel Ellsworth's regiment, and served out to them the spear, in the shape of a sabre on the end of a Minié musket, and may Heaven help those under the edge of whose bayonets these “pet lambs” shall succeed in getting. The sabre bayonet is also to be distributed throughout the entire army, and I feel certain, from what I have gathered through military men, that the actual embrace of battle, man to man, is what the Northern captains of this war intend mostly to rely upon.

FELT CLOTH.—A peculiar mode of making a kind of felt of cloth, is that by the pneumatic process, without spinning, weaving, or any analogous machinery. Into an air-tight chamber is put a quantity of flocculent particles of wool, which, by a kind of winnowing wheel, are kept floating equally. On one side of the chamber is a network or gauze of metal, communicating with another chamber from which the air can be abstracted by an exhausting syringe, or air pump, and on the communications between the chambers being opened, the air rushes with great force to supply the partial vacuum in the exhausted chambers, carrying the flocculent particles against the netting, and so interlacing the fibers, that a cloth of beautiful fabric and close texture is instantaneously made.

Important Invention.—Dressing Yarns for Weaving.

All cotton and linen yarn requires to be sized in the warp as a preparation for weaving in the loom. In dressing the warp of fine muslins a little grease is also applied, to render the threads soft and to preserve them in a slightly damp condition. It is scarcely possible to weave fine goods in a dry atmosphere, because the threads are so liable to break. All hand loom weavers of fine muslins have damp unhealthy shops, with earthen floors; and it has been asserted that the dry atmosphere of America prevents our manufacturers from spinning and weaving such fine yarns as the English manufacturers. We have always entertained the opinion that art could supply what nature had denied, in making an artificial damp atmosphere with steam; but a French inventor—Frederick A. Fresspel, of Paris—has resolved the difficulty in another manner. He has lately taken out a patent for making sizing with glycerine, glue and starch, as follows: He takes 100 kilogrammes of glycerine, heated to 24° Baume, 1 kilogramme carbonate of soda, 1 kilogramme of glue, 10 grammes of borax, and an equal weight of alum. These are all mixed together—being dissolved in the glycerine with sufficient water for the purpose. [A kilogramme is 2 lbs. 3 ozs. 5 drachms; a gramme is 15.4440 grains.] To the above a boiled solution of starch is added, until the whole is sufficiently thick for sizing the yarn. The glycerine is a hygrometric fluid, and the patentee states that this size preserves the yarn in a moist condition, and permits weaving to be conducted in the driest places.

STREET RAILWAYS.—In the Commons a bill for enabling people to make railways in the streets came on for second reading. This is the plan of Mr. Train, an American gentleman, who has actually got two such railways at work in London, and who, if he never does anything else, deserves the gratitude of the English lady for shaming the proprietors of the dirty, inconvenient nuisance called the British Omnibus, by producing a vehicle into which a woman can step decently, and sit in cleanliness and comfort. Also for substituting neatly uniformed and civil men for the coarse cads who at present bawl behind the buss. However, the question of giving the powers required by this bill is a distinct one from that of the advantage of the Train vehicles, and the bill was negatived after—perhaps because of—a smart speech in its favor from Mr. Bright.—*Punch's Essence of Parliament.*

A NEW APPLICATION OF PHOTOGRAPHY.—A circumstance recently occurred showing the great business utility of the modern discoveries of photography and the electric telegraph. The Count de Penafiel left Lisbon for Paris, carrying with him an order for 70,000 francs. This, however, he unfortunately lost on the road, and telegraphed the same to his banker at Lisbon. That gentleman at once telegraphed to Paris, stopping payment of the order, but sent by post the portrait of the Count de Penafiel, stating that the amount might be paid to him when he presented himself.

TESTING A LENS FOR SPHERICAL ABERRATION.—Point the camera at a very small bright object, such as the image of the sun reflected from a convex glass surface, and get it into proper focus. Now move the lens to and fro, in order to throw the visual image on the ground glass alternately within and without the focus; the bright point will expand into a luminous disk, and if it shows a firmer margin within than at an equal distance without the focus, it is under corrected for spherical aberration and slightly over corrected for color, as all photographic lenses should be. If any color be visible, it should be merely a slight fringe of blue within the focus or red without.—*Journal of Photography.*

In a recent discussion in the Institution of Naval Architects in London, John Scott Russell alluded to R. L. Stevens, of New York, as the father of the system of iron-plated war vessels, and quoted his experiments to show that 6-inch iron plate would keep out 68-pounders altogether. Sir Howard Douglas, the great authority on naval gunnery, who has vigorously condemned the new iron-cased war vessels, now admits their necessity, but says that the iron plates must be put upon a wooden, and not an iron hull.

How they Make Cod Liver Oil.

A tourist in Newfoundland thus describes a visit to a cod liver oil factory at Petty Harbor, near St. Johns:—

The process of making this article is quite simple. The livers, fresh from the fish, and nearly white, are cleanly washed, and thrown into a cauldron heated by steam instead of fire, where they gradually dissolve into oil, which is dipped out hot and strained, first through conical felt bags, and then through those made of white moleskin, from which it runs pure and sweet as table oil. Wine glasses were at hand, from which we tasted it, and found it entirely agreeable. In this state it is barreled for market, and sold at an average price of one dollar and fifty cents per gallon. By what process it is transmuted into that horrid stuff which is sold at a high price, in small bottles, perhaps the druggist can inform us. When I mentioned the character of cod liver oil in New York, a gentleman present, qualified to decide, did not hesitate to say that it was adulterated with some cheap, base oil. Near by a fish house, there is ordinarily seen a row of hogheads open to the sun, and breathing smells that none but a fisherman can abide. A near approach discovers these casks to be filled with cod livers in a state of fermentation. After a few days in the sun, these corpulent and sweaty vessels yield a rancid, nauseous fluid, of a nut brown hue, at a much less cost than the refined oil of the manufactory, and which, I imagine, must have a flavor not unlike that which the invalid finds lurking in those genteel fasks on the apothecary's shelves. After all, our common whale oil, I suspect, after some cleansing and bleaching, and slight seasoning with the pure, is had enough for sick people.

A Whale Seized.

This is a day of seizures, and Boston has had a hand in bagging some big game. The proprietors of the aquarial gardens have fairly outdone Barnum, and now invite the Bostonians to come and see a live whale, which was safely introduced into his tank on Friday. We copy the following particulars from the *Atlas*:—

The present whale was caught in the St. Lawrence river, Upper Canada, between the Orelle and DuLoup rivers. His capture was secured by weirs, a sort of trap made of wooden stakes, inclosing an area of several miles of water, but so shaped as to concenter to a point, where big fish are nabbed. These weirs are set regularly each year for the whales, at a time when they make their annual visit to the locality in question. Fourteen have been caught within two months, which period is commonly accounted a season. Having been secured the one spoken of was placed in a huge box for transportation.

Before this was accomplished, however, the whale gave its captors very much trouble by his powerful flappings, &c., &c., having floundered some Frenchmen several times, much to their peril and inconvenience. The box was lined with seaweed, and was partially covered at the top with slats. The precious freight was then carried seven miles over one of the roughest roads in Canada; and from thence by rail 500 miles to Boston, by special trains, at an expense of some \$700. The whole enterprise did not cost less than from \$1,000 to \$1,200. The whale is twelve feet long and weighs two tons. His transportation was attended by many interesting events. At each station the monster was well watered as if he had been a locomotive. The aqueous attentions were quite necessary during the journey of sixty hours. All along the route the distinguished traveler was the object of great curiosity and the most animated conversation.

The whale is fed on fish. It eats a peck of herrings at a meal, though not on the whole a great eater, his size considered. Its diet when in its natural waters is chiefly a fish called the capelan.

Zinc and Steam.

The Paris correspondent of the *London Photographic News* says, upon this subject:—

The employment of electricity as a motive power depends on its relative economy with steam, or the difference between the cost of zinc and coal; for in the electric battery it is the zinc that is consumed, and is at present the most economical combustible for the purpose. Yet it is 105 times dearer than coal. Then to the cost of the zinc must be added that of the acids, making, for the same equivalent of power, zinc 200 times more costly than that of coal; or, rather, the cost of electro-motive power is so much dearer than that of steam power. But a remarkable feature in the question is that, while ordinary steam engines render only 0.052 of chemical power, the electro-motive machine yields 0.20 to 0.25, which is enormous, and gives it an undoubted superiority over steam. Yet, even at this rate, electro-motive power is twenty times dearer than that of steam. The question to be solved, therefore, is the economic production of electricity.

THE SURRENDERED GENERAL.—After the capture of Lord Cornwallis at Yorktown, he was one day standing in the presence of General Washington with his head uncovered. The General politely said to him: “My Lord, you had better be covered from the cold.” His lordship, applying his hand to his head, replied: “It matters little, sir, what becomes of this head now.”

PRIVATEERING.—The *London Volunteer Gazette*, which is said to be edited by W. H. Russell, special correspondent of the *London Times*, now in the South, denounces Southern privateering in the most unmeasured terms, such as: “The scum of the scoundralism of the world;” “We most heartily wish every one of them a short shrift, a strong cord, and a jump from the yard arm of the nearest man of war;” “We therefore owe it to the United States to put down, with a high hand, any privateering against them.”