

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 $3\frac{1}{4}$ inches 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.