

CAN GUNCOTTON BE USED FOR ARMY PURPOSES?

Judging from remarks in some Southern papers, gunpowder is becoming scarce in the secession region, and the employment of guncotton is recommended as a substitute. The New Orleans *Delta* directs the attention of chemists to this subject, but in doing so exhibits a great want of correct information on the subject. It states that guncotton is made by steeping common cotton in "monohydrate of azotic acid for fifteen minutes, after which operation it is washed and dried and becomes one of the most powerfully explosive substances known." The chief reason alleged why it has not heretofore been used in warfare is its great cost, but it says "this objection is not applicable in the South, as the principal ingredient, cotton, may be had for the asking." It also states that while it is better than gunpowder for charging bomb shells and blasting in mines, it is unfit for small firearms on account of its vastly greater explosive power, which causes them to burst.

It is not because guncotton possesses greater explosive force, weight for weight, than gunpowder that it has not been used for rifles, as all that would be required to make them equal is to use smaller charges of the former. A charge of guncotton equal in weight to a common charge of gunpowder has burst a steel rifle barrel as if it had been glass. This was owing principally to its very rapid ignition, not its greater explosive force. Although steel has been held to be the strongest and best metal for rifle barrels, it is perhaps more liable to burst than the excellent wrought iron used in the barrels of the rifle made at the Springfield Armory. Good fibrous iron is not so easily broken with a sudden blow as hard steel. An officer in the army has informed us that he has frequently used guncotton mixed with an equal weight of raw cotton in a rifle-musket, and he is confident it may thus be employed with safety, but owing to the high price of cotton it would be far too expensive at present in the North for army purposes; and it is a far more hopeless subject for the Confederates. They have got the cotton but this article is useless without chemical agents.

To make this peculiar explosive substance, clean raw cotton is immersed in equal parts of concentrated nitric and sulphuric acids. After being immersed for a few minutes, until it has assumed a peculiar opaque appearance and has lost its elasticity, it is taken out and washed with soft water until all traces of acid are removed, when it is dried. These operations must be conducted with great care. Although cotton may be obtained for nothing at the South, neither sulphuric nor nitric acids are to be had there, consequently, guncotton is out of the question for secession bombs and bullets. The explosive force of guncotton, as compared with gunpowder, is as 4 to 1, weight for weight, as has been determined by Major Mordecai, U. S. A., in a series of experiments. Although sulphuric acid is used in its manufacture, no sulphur has been found in its composition. It is the nitrate of lignin, and its chemical constituents are:—

Carbon.....	20.000
Oxygen.....	62.220
Hydrogen.....	2.220
Nitrogen.....	15.560
	100.000

It is certainly more cleanly and more compact than gunpowder, and for shells it is superior, but more water is formed during its ignition; hence it is said to be more corrosive in its action upon the metal, which is a great and perhaps fatal objection to its general employment for firearms.

ARMSTRONG GUNS ON THE "MERRIMAC."

The correspondent of the New York *Times* at Fortress Monroe, in his letter dated March 12th, in describing the *Monitor* after its late conflict, says:—"All over her are slight indentations or depressions where the Armstrong balls struck and fell harmless on the deck." We have also read statements of other correspondents to the effect that the *Merrimac* was equipped with several Armstrong guns.

Those who write upon such subjects should not give mere hearsay information. There are no such missiles as Armstrong balls anywhere, and there is not a single Armstrong gun out of the British navy and army. All the Armstrong guns are manufactured under contract for the British government, but according to

the statements contained in the columns of our worthy cotemporaries, the London *Engineer* and *Mechanics Magazine*, Sir William Armstrong's guns are really about the worst ever made. They are not to be compared to American guns for strength, efficiency and simplicity. Capt. E. P. Halsted, R. N., condemns them. Their vent pieces blow out; they very soon become clogged and unfit for firing; they are liable to leak at the breech, and are inferior in range and precision of fire to the Whitworth gun.

CALIFORNIA STATISTICS AND PROGRESS.

The value of California products exported from San Francisco in 1861 was: products of the mines \$42,103,193; of agriculture, \$3,265,471; of cattle, \$1,041,217; timber, \$69,931; fisheries, \$21,828; manufactures, \$962,876; wine \$8,000; total, \$47,472,516. The gold coinage in the San Francisco mint was \$16,126,000; of silver, \$475,000. Wheat, barley, oats, wool and hides are the principal products of farm export from California. This barley is the best that comes to New York, and the hides are not surpassed by any others.

River mining is now almost entirely abandoned to the Chinese, who are contented with small gains. The days of making a fortune by washing the earth with a tin pan are gone forever, it is believed. Hydraulic mining—washing the earth with a great pressure of water directed upon it through hose—is still conducted upon an extensive scale, and continues profitable. Gunpowder is now employed to blast banks of hard gravel and loosen the earth prior to applying the hose pipe for washing. No less than 70 kegs of powder was used last year by one company, in Placer county, in a single bank 60 feet in height.

The late silver discoveries in California are of the most surprising and gratifying character. The San Francisco *Bulletin* states that in Nevada county, a few miles from Grass Valley, there are two leads which have been worked for a number of years past for the gold only, which have been found to contain large quantities of silver—late assays showing that the ore contains from 300 to 800 ounces to the tun. Searches made for the purpose of discovering silver ore have resulted in obtaining such ores in a great number of places where it was not suspected to exist. Some of the silver veins are equal to the richest in Mexico.

Rich copper leads were discovered in the early part of last year in Salt-Spring Valley, near Stockton, and a new city, named Copperopolis, has been laid out, and it seems to be in a fair way of rising into importance. Several hundred miners are employed by four or five companies. The ore contains from 33 to 56 per cent of copper, and yields 2½ ounces of gold and 11½ ounces of silver to the tun. Several thousand tons of the ore have been sent to Boston, Mass., and to Swansea, England, for smelting. A rich specimen of this ore, weighing 2,500 lbs., has been sent to the World's Fair in London. A considerable quantity of nickel has also been obtained in some of the ores.

Large deposits of the oxide of the manganese have been found in Nevada county; petroleum springs in Santa Clara, Humboldt and Mendocino counties; diamonds in Butts county and coal in Alameda county. The quantity of coal mined is still small, being about 30 tons per day. Three thousand tons have been forwarded to San Francisco, where it sells at \$15 per tun. Other coal veins are said to have been discovered in Nevada county, but, so far as we have been able to learn, the veins are very thin. A plentiful supply of coal seems to be California's great want. It never can become a permanently great mining and manufacturing country without cheap coal. This important article may yet be discovered in great abundance.

HARBOR DEFENCES.

Some of the leading merchants of this city appear to be trembling for fear of a visit from the *Merrimac*. A special meeting of the Chamber of Commerce was held on the afternoon of the 18th inst., for the purpose of discussing this question and devising measures for the defence of the harbor. The Mayor of the city, Peter Cooper, Capts. Ericsson and E. E. Morgan expressed their opinions, and delegations from the Philadelphia and Boston Boards of Trade were also present. The general opinion that prevailed respecting land forts was that they were useless against iron-

clad vessels. A resolution was therefore passed declaring it "the duty of the cities of New York, Boston and Philadelphia to enter at once upon the creation of iron-clad vessels of the requisite strength and power to cope with the *Merrimac* or other formidable floating batteries." Capt. Ericsson advised the construction of several light iron-clad vessels to carry large 15-inch guns, but Capt. Morgan advised the conversion of old harbor tugboats into steam rams, for striking such a vessel as the *Merrimac* under the waterline and sending her to the bottom in hot haste. Capt. Ericsson's suggestions were founded upon providing a class of small-iron clad vessels to resist such a vessel as the *Warrior*; those of Capt. Morgan to attack the *Merrimac*. They seem to have been made under the idea that if a large iron-clad frigate visited New York harbor with warlike intent it would stand still and allow small steam rams to dash into its sides; and light gunboats to stand off at a distance and fire away, without receiving a shot, or a blow in return. Our harbor defences should undergo a complete revolution, but we trust no money will be needlessly expended upon new floating batteries of doubtful character.

OUR NAVY A YEAR AGO.

In the month of April, 1861, we spent a few days in the City of Washington, and while there we passed one profitable hour with Capt. John A. Dahlgren, Commander of the Washington Navy Yard. In view of the possible dangers that then threatened our country, we found that accomplished ordnance officer fully awake to the importance of iron-clad ships. He had presented this subject to the attention of the naval authorities, as early as Dec. 1860, in proof of which we invite our readers to turn to page 274, Vol. IV. of the *SCIENTIFIC AMERICAN*. That paper is worth reading. It is a document that possesses at this time historic value. On our return from Washington we published an article entitled "The Real Strength of our Navy," which closed with these words "no time is to be lost in commencing a *ship in proof*. Such a vessel would have steamed into Charleston harbor any day, and kept up a permanent communication with Fort Sumter, regardless of the fire of the batteries, if they had rained shot and shell on her and that without carrying a single gun, or needing a shot from Sumter to cover her." Such was the language we used on April 27, 1861, and we ask the public to say whether our suggestion was not worth heeding.

Who is the Man?

The whole world is intensely interested in the question of iron-clad war vessels. Thus far Capt. John Ericsson has placed his name above all others in this country for originality of design and rapidity of execution. The country will ever owe him a debt of gratitude for his ingenuity and perseverance. He who discovers the best form of vessel for war purposes in all points of economy and effectiveness will be sure of pecuniary reward and historic fame. Who is the man?

STEVENS BATTERY FOR FRANCE.—It is reported that M. Mercier, the French Minister, recently visited the Secretary of State to know if there would be any impropriety in obtaining and forwarding to his government copies of the plans, specifications and drawings of the celebrated Stevens battery. The privilege was freely accorded him, and M. Mercier and Senator Hale, Chairman of the Senate Naval Committee, called upon Mr. Stevens for the documents to enable the French government to add to its already formidable iron-clad steam war marine.

Picture of the "Monitor."

The *SCIENTIFIC AMERICAN* of last week contains the only correct illustration of the *Monitor* which has yet appeared. Every other plan we have yet seen, must have been hatched up in the brain of the artist without his ever having seen the battery. We will furnish electrotypes of it on receipt of \$5.

WATER GAS—LIGHT WANTED.—What has become of Sanders's water gas? We predicted its failure, yet we were assured by most respectable gentlemen in Philadelphia, who were interested, that it was a success, and that our prognostications would be upset. We repeat the inquiry—What has become of Sanders's water gas?