Old Ammunition.

The huge pyramids of spherical shot and shells deposited in various parts of the Royal Arsenal, Woolwich, are condemned to the melting furnaces for conversion into projectiles more adapted to modern requirements. One heap alone contains about 40,000 of the 13-inch shells which were supplied at the time of the Crimean war, and were the most formidable missiles used in the siege of Sebastopol. The 13 inch mortars, from which they were fired, have long ago disappeared out of use, but lie in hundreds in a distant part of the arsenal waiting orders for their demolition, and no round shot or shell of any size have been made since the introduction of rifled ordnance and elongated projectiles. They are being all gradually broken up. Another ancient description of shell of the class known as smoke balls and ground light balls has been declared obsolete, and all that are remaining in store will be destroyed. They are of various sizes, varying from 4½ inches to 13 inches in diameter.

Covering Iron and Steel with Copper.

According to the *Metallarbeiter*, iron can be coppered by dipping it into melted copper, the surface of which is protected by a melted layer of cryolite and phosphoric acid. The articles to be coppered must be heated to the same temperature as the melted copper.

Another process consists in dipping the articles into a melted mixture of one part of chloride or fluoride of copper, and five or six parts of cryolite, and a little chloride of barium. If the article when immersed is connected with the negative pole of a battery, it hastens the process.

A third method consists in dipping the article in a solution of oxalate of copper and bicarbonate of soda, dissolved in ten or fifteen parts of water, acidified with some organic acid.

A MASSIVE SCAFFOLDING.

The Manhattan Company's Bank and the Merchants' National Bank are now erecting a building at Nos. 40 and 42 Wall Street, this city, after designs by W. Wheeler Smith. The building extends through to Pine Street. It will have a front of plain and polished granites from the Hallowell, Fox Island, and Westerly quarries: the floors will be iron beams resting upon iron columns.

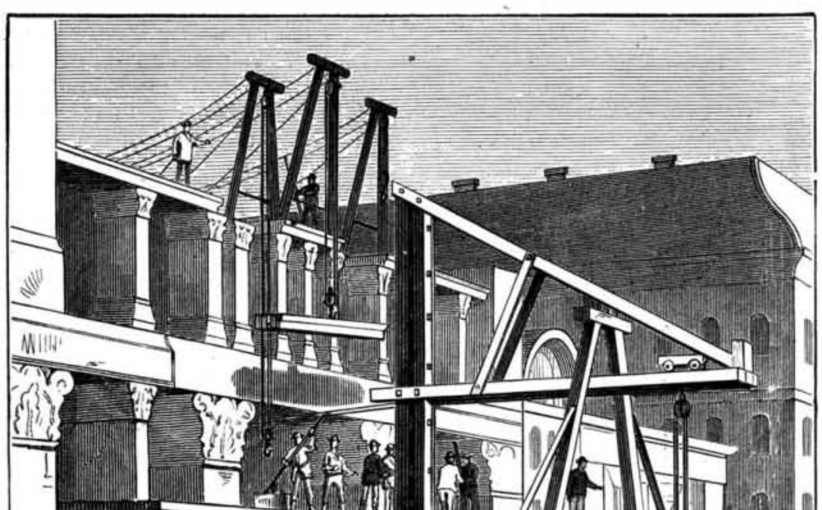
In order not to interfere with street traffic and at the same time to expedite the handling of heavy pieces, and be free from the annoyance caused by curious sightseers, a scaffolding of massive strength was erected, shown in the accompanying engraving. The posts composing this framework are 12 by 12 inch pine timbers held together by lateral braces, and between each panel are wooden diagonals. The outer line of posts is set alongside the curbstone. Transversely on top are placed floor beams, 12 by 14 inches, and 6 feet between centers, which project a short distance beyond the curb line, and on these, parallel with the street line, is a flooring of planks 3 inches thick, above which is a second system of planks the same thickness, but laid obliquely.

Raised above the sidewalk is a passageway extending the whole length of the staging. This has a width of 4 feet 6 inches, and is reached by a flight of steps at each end. By this means the foot travel of the street is not interfered with.

The center of the scaffolding is wide and high enough to admit a wagon, which is driven in and unloaded upon the first floor of the building.

The rear post of the main derrick rests just outside the front wall, and consists of two timbers 10 by 12 inches, bolted at intervals to each other and to the main posts. These are placed in a line perpendicular to the street. About 12 feet above the floor is the horizontal arm of the derrick, consisting of two timbers 10 inches square, and placed a few inches apart. The diagonal from the top of the rear post extends over an A frame, and is joined to the end of the horizontal arm. Upon the upper inner corners of the timbers forming this arm are angle irons, constituting the track upon which a little car travels. From the under side of the car hangs a block and tackle. The car is run to the outer end of the track, under which the wagon has been driven, and the hook is attached to the piece to be raised. The hoisting rope extends to the engine in the interior of the building. When the piece has been elevated above the floor, the car is run back and the piece is lowered on to a hand truck, or rollers, by the aid of which it is moved about on the floor. Distributed about parts of the building are derricks that raise the stone and leave it in its final resting place.

The various parts entering into the construction of the scaffolding are held together by nuts and bolts, plates being placed under the heads and nuts. It was designed so as to have sufficient strength to support upon the flooring all the material immediately to be used, thereby relieving the street of all unsightly heaps. Another consideration is that people are not subjected to danger from falling pieces while passing the building.

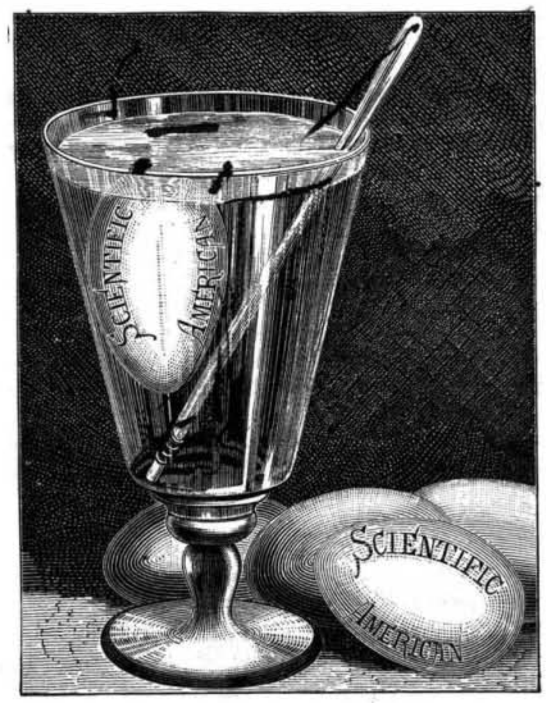


A MASSIVE SCAFFOLDING.

ENGRAVED EGGS.

Some time ago there was a man who stood upon the street corners and in the public squares selling egg shells upon which were engraved names, devices, or flowers. The art of engraving upon eggs is connected with a curious and little known historical fact.

In the month of August, 1808, at the time of the Spanish war, there was found in the patriarchal church of Lisbon an egg upon the shell of which was announced the approaching extermination of the French. This fact caused a lively fermentation in the minds of the superstitious Portuguese population, and came near causing an uprising.



ENGRAVED EGGS.

The French commander remedied the matter very ingeniously by distributing throughout the city thousands of eggs that bore engraved upon them a contradiction of the prediction The Portuguese, deeply astonished, did not know what to think of it, but thousands of eggs giving the lie to a prediction engraved upon one only, had the power of the majority. In addition, a few days afterward, posters put up on all the street corners pointed out the manner in which the miracle was performed. The mode of doing it is very simple.

It consists in writing upon the egg shell with wax or varnish or simply with tallow, and then immersing the egg in some weak acid, such, for example, as vinegar, dilute hydrochloric acid, or etching liquor. Everywhere where the varnish or wax has not protected the shell, the lime of the latter is decomposed and dissolved in the acid, and the writing or drawing remains in relief. Although the *modus operandi* presents no difficulty, a few precautions must be taken in order to be successful on a first experiment.

In the first place, as the eggs that are to be engraved are usually previously blown, so that they may be preserved without alteration, it is necessary before immersing them in the acid to plug up the apertures in the extremities with a bit of beeswax; and, moreover, as the eggs are very light, they must be held at the bottom of the vessel full of acid by means of a thread fixed to a weight or wound round the extremity of a glass rod.

If the acid is very dilute, the operation, though it takes a little longer, gives better results. Two or three minutes usually suffice to give characters that have sufficient relief. —*La Nature.*

Velocities.

An interesting table of velocities has been drawn up by Mr. James Jackson, the librarian of the Paris Geographical Society. He begins, says the *Photo. News*, with the velocity of a man walking two miles and a half an hour, and after alluding to the respective velocities of an ordinary wind, of a race horse, of an express train, of a carrier pigeon, of a hurricane, of sound in air and water, he brings us at last to the velocity of heavenly bodies, of electricity, and, finally, of light. But Mr. Jackson has left out one important velocity, which has only been recently computed, and which is of singular interest, since it represents the only earthly agent known to man with a velocity quicker than sound in water, although naturally less quick than electricity and light; we mean the detonation of the photographer's old friend, gun cotton. Abel and Noble have computed that a train of gun cotton, fired with a fulminate fuse, will transmit the detonating action at a speed of from 17,000 to 19,000 feet per second. In other words, detonation travels at the rate of 200 miles a minute, while next in order comes electricity traveling through a submarine wire at a speed of some 12,000,000 feet per second.

How Fire is Carried in Cotton.

Edward Atkinson, of Boston, says: "Fire lurks in a cotton bale for weeks. The cotton which was injured somewhat over a year ago in Biddeford, Me., was moved to South Boston for sale. The fire broke out again more than once while it was at South Boston being made ready for sale. It was then sold at auction. The fire broke out again in one parcel while it was on the cars being carried away, and in another parcel after it had been received at a factory where it was to be used. The latest outbreak was, I think, thirty days after the original fire."

Sorghum Sugar in Ohio.

A correspondent of the *Ohio Farmer*, conducting a sugar factory in that State, says:

"Not a single man that brought cane to our mill raised as much as one whole acre of it, generally from one-eighth to one-quarter of an acre, and they would have from one load to three or four good wagon loads of the cane; but over four-fifths of them simply wanted molasses for cooking purposes. And but a small portion of it were they willing should be cooked into sugar. Because we did not make more sugar was because we were not allowed to do so. Every gallon of good molasses made from matured cane, agreeable to the Stewart process, will granulate fully four pounds of sugar the first granulation. Estimates give 106 gallons per acre of sorghum molasses as the yield for Ohio. If this be true it would make fully four hundred pounds of dry sugar and seventy gallons of drainage molasses, worth from 35 to 45 cents per gallon at wholesale for cooking purposes. We have sold every particle of our drainage molasses at 35 cents per gallon, and if the sugar is left in we sell it from 69 to 75 cents per gallon. No man can get as much money from an acre of land in corn as he can from sugar cane, if he lives close by a sugar factory. The average worth per acre, if made into molasses alone, under the Stewart process, would be over sixty dollars per acre; and if made into both sugar and molasses it would come to fully seventy dollars per acre; besides this, the crop of cane seed if properly saved, cured, and thrashed, the same as wheat, is worth half as much for feeding purposes as the average acre of corn will yield in the same vicinity." And in any place and upon any circumstances whereby you are able to raise a reasonably good crop of corn, sugar cane will do equally well in the same field. It is more work to cultivate it, because you should plant more hills to the acre; but you can hoe a hill of one just as easy as you can the other, and the cutting is just the same. If you save the cane leaves for fodder it makes more work, but the fodder fully pays for that. The cane seed can be thrashed as easy and exactly the same as wheat, and will yield over fifteen bushels per acre on all cane that is good enough to make 106 gallons of molasses to the acre. The Rio Grande Sugar Company raised and worked up in 1882 about 800 acres of cane—not quite that amount as given into the State of New Jersey for the bounty money. They produced over 330,000 pounds of sugar and twice that number of pounds of drainage molasses. It is a well known fact in that vicinity that it was a very profitable business.

Manufacture of Bits.

In the United States there are fourteen bit factories, eleven being in Connecticut. A *Sun* correspondent recently described the various operations necessary in the manufacture as carried on at Chester. Along the ceiling of the forging room extend lines of heavy shafting filled with driving pulleys from 6 inches to as many feet in diameter. The floor is of clay, packed as hard and smooth as cement, and on it are thrown heaps of red hot bits. Long bars of cold steel are placed between shears which cut them as easily as a lady cuts thread with a pair of scissors. The steel bars are placed in forges which heat them to a white heat, when they are put under trip hammers, striking hundreds of blows per minute, that flatten the bars on one end, round the center, and square the other end. The bit has now started into existence, and is called a "plate."

"It is next passed to the crimpers, who again heat it to whiteness and run it through machines which twist the flat end into a 'pod,' or spiral of beautiful regularity. The 'swedgers' seize it now, and again under the influence of the blowpipe the steel is soon red hot, when one blow from a powerful drop fashions the square end into a shank properly beveled for the bit brace; again it is heated and passed under another drop, which stamps on its shank a figure telling the size of the hole it will bore when finished. Once more it endures the fiery ordeal, and, glowing red, passes through the heading presses, which with a hug and a squeeze crush two inches of the twisted end into a mass in which you faintly discern the point spurs and cutting edges of the future bit. It is next carried into the annealing room, where, with thousands of others, it is buried beneath heaps of charcoal and thoroughly baked until the steel is well softened or annealed. Next it is pickled for several hours in vats containing a strong solution of sulphuric acid, which eats off all the scale left by the many previous heatings in the forges.

"The bit now passes into the machine room, where the rasping machine cuts out all superfluous stock in the head, forming rude cutting edges. The milling machine cuts the point smoothly to the correct bevel, ready for the screw to be made upon it. The leveling machine smooths the bottom of the blades, the facing back machine cuts the edges of the blades straight, the screw cutting machine forms the threads on the point, and the sizing machine cuts the boring end to the exact diameter required. And still the bit is only about half made.

"You pass into another department, and here you see long rows of skilled mechanics seated upon high stools, each man having in front of him a heap of bits and a lot of files of various sizes and forms, known as 'square' 'round,' 'flat,' 'half round,' 'humpback,' 'ground-off,' and 'feather-edge,' and each of these is used in turn to form and smooth the various parts and cutting surfaces of the bit. The squeaking of a hundred files of almost as many sizes and shapes fills the air with shrill notes and sets your teeth on edge.

"You pause for a moment to watch a couple of men who, seated in front of tiny forges, are heating the bits to a cherry red color and then dipping them into dishes of oil and water. You learn that they are tempering them to the proper degree of hardness for cutting. You also learn that, although they can control the temper of the steel, they cannot control their own—when they burn their fingers.

"You now open a door lettered "Polishing Room," and start back at the scene which meets your gaze. A living reproduction of Dante's dream is before you. Men with faces blackened by charcoal dust and emery stand in long rows, while a sheet of fire five or six feet long plays from the hands of each, lighting up their blackened features and making them look like veritable demons. Each man holds in his hand a bit and presses it upon the polishing wheel, which makes many thousand revolutions in a minute, causing by its friction a great sheet of sparks to fly out in front of the operator. You behold the many different processes of finishing as the bits pass on from one workman to another down the row, until at last they look as bright as burnished silver.

"In the packing room many men are sharpening the finished bits, and a few inspectors are examining them with magnifying glasses to see if they can detect any scratches that have been left by the polishers. Here also the bits are sorted into first class and second quality, stamped with the manufacturer's name and trade mark, wrapped in strips of paper, and packed in pasteboard boxes. You are astonished at the variety of sizes and forms, running from small bits hardly an inch long, up to car bits, more than two feet in length, and from the little bit cutting a hole but three-sixteenths of an inch in diameter to the great six-inch auger, which requires two strong men to turn it. You are struck, too, by the oddly shaped machine bits and the curious mortising bit which bores a square hole."

THE GIANT HERON.

The giant heron (Ardea Goliath gigantodes and nobilis) is found in the central and southern part of Africa. The feathers of the upper part of the head and the tuft upon the top of the head, also the feathers on the curve of the wings and the under part of the body with the exception of the white throat, are chestnut brown. The remaining upper part of the body is ash gray. The loose hanging feathers on the fore part of the neck are white on the outside, and black inside. The eye is yellow, the upper part of the bill is black, the under part is greenish yellow at the point, and violet color at the root. The foot is black. The length of this heron is about one hundred and thirty-six centimeters, the breadth one hundred and eighty-six; the length of the tail twenty-one centimeters, and the length of the wings fifty-five.

This bird is found near shallow water. It visits small ponds in the fields, water ditches, and pools, and in winter seeks shallow bays of the sea and waters about the coast, especially where there is a forest in the vicinity, or at least high trees, where it is accustomed to rest.

These giant herons are more timid than any other of the species. Every clap of thunder terrifies them, and they are afraid of men even when seen at a distance. It is a very difficult matter to surprise an old heron, for it seems conscious of every danger, and immediately takes to flight if frightened. They have a shrill voice.

Their food consists of fishes, frogs, serpents, especially adders, young swamp and water birds, mice, insects that live in the water, and earth worms. Naumann says that when a heron reaches the pond, if it does not suspect the presence of an observer, it generally goes immediately into the shallow water and begins to fish. Bending its neck, and lowering its bill, it fastens a keen look upon the water, and moves softly and with measured strides, but with such cautious steps that not the least splashing sound is heard. It circles round the whole pond in this way, seeking for food, throwing its neck quickly forward, then suddenly drawing it back, holding a fish firmly in its bill. If the fish aimed at is in deep water, it moves with its whole neck under the water, and in order to preserve its balance opens its wings a little. It seldom misses its aim.

These herons form settlements, the nests sometimes numbering a hundred. In April the old herons make their appearance at the nests, repair them if necessary, and then begin to lay. They are about a meter broad, shallow, and simply put together of sticks, twigs, reeds, or straw. They are lined in a very slovenly manner with hair, wool, or feathers. They lay three or four eggs, which average sixty millimeters in length and forty-three thick. The shells are smooth, the color is green. After three weeks of brooding the young birds are hatched. They are helpless, awkward, ugly creatures. They seem to be constantly hungry and eat an incredible amount. They remain in the nest about four weeks. After leaving the nest the parents care for them for a few days, and then leave them to their fate. Old and young then disperse, and the settlement is deserted.

Baldamus says that the fear which these herons have of all birds of prey, even crows and magpies, is really laughable. The robbers appear to know this, for they plunder the heron settlements with shameless impudence, and expect no greater revenge than a few feeble blows of the wings.

They are easily raised in captivity, their food consisting of fish, frogs, and mice.—*From Brehm's Animal Life.*

GIANT HERON.—(*One-fifth Natural Size.*)

Snake Mortality in India.

The great mortality in India resulting from snake bites is the direct issue of carelessness on the part of the natives. The snakes abound, the country and climate being particularly favorable, and the foreign residents being their only enemies, the Hindoos not only refraining from killing them but failing to take any precautions to ward off attacks. The native wears little or no clothing; his house is built on a level with the ground, the greater part of the front being formed of hanging mats; his chattels are generally kept in the darkest part of the hut. The snake, being compelled or from inclination desiring to change his quarters, enters the domicile and coils up in the gloomiest part. The first visit of the owner disturbs and angers him, and his resentment is proved by the presence of two little punctures on some part of the dead body of his victim.

The houses of Europeans are raised above the ground, every opening, even the drain pipes, carefully guarded against the ingress of snakes; above all, the houses are well lighted. The Europeans are well clothed and their feet protected by leather, so that the attempt of the reptile to strike is seldom successful. As a consequence we find that of the 22,125 persons killed in India last year by snakes and animals, 19,519 were killed by snakes. The government paid rewards amounting to 141,053 rupees, and 322,421 snakes were destroyed.

How Salmon Eggs are Obtained.

The work of stripping begins during the latter part of October and is continued until all the fish have been operated upon. The Portland (Me.) correspondent of the Boston *Journal* says that the fish when wanted are taken from the water in a dip net, and their condition readily ascertained by gently pressing the abdomen just back of the pectoral fin. If the ova are ripe they will be felt like so many peas beneath the skin, and a slight pressure will cause them to be deposited in a pan placed for that purpose. If the ova are not ripe, or the fish is not disposed to yield them, she is returned to the water a few days longer. After the ova have been deposited the milt is obtained from the male in the same manner, and immediately after falling upon the ova it diffuses itself among them, causing them to at once individualize and grow harder, till within two hours they will be as hard as unripe peas and perfectly globular in form. At once after this fertilizing process the ova are washed several times in cold water, and then set away in cold water for a couple of hours, that all impurities may be removed. The number of eggs obtained from each fish varies from 2,000 to 20,000, the latter number having been obtained this season from a 44-inch salmon, estimated to be a dozen or more years old, and about as old as any are ever obtained for spawning purposes, as the ages of such fish are estimated to be from four to fourteen years. At the expiration of the two hours mentioned above the ova are prepared for the hatching troughs by being placed upon wire screens with meshes about an eighth of an inch square. These screens are inclosed in frames a foot square, and thick enough to allow a half inch of water to flow beneath each one, to assist which an eighth of an inch is removed from the bottom of each of the four sides for three-fourths of their length. Ten of these hatching frames are then placed above each other in a skeleton frame to form a "nest," and the whole then deposited in the hatching troughs of a depth and width just sufficient to contain a row of these nests, after which the water is turned on and a steady flow maintained through the trough till the latter part of January, when the ova will have developed as much as it is safe to allow before distribution among the several States, under whose care they are finally hatched and disposed of as desired.

A Good Deal of Sweetening.

At the recent opening of a new commercial exchange in New York, the president stated that the annual value of the raw sugar imported and produced in the United States considerably exceeded our importations of tea and coffee, with silk, hides, hemp, and rubber added. The figures for sugar were stated at $130,000,000.