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Improved Bolt and Rivet Machine.

Screw bolts and nuts are indispensable in the arts and manufactures, and are in such demand that they always find a market and quick sale. The great object with mechanics and manufacturers, therefore, is to produce them in large quantities, of the best quality and workmanship.

In former times—not so very long since, either—all bolts were forged by hand. That is to say, the rods were cut the right length, collars were turned over and welded on the rods, and finally squared up to form the heads, and, after much swedging, and upsetting, and reheating, and other operations, a five-eighth bolt would at last be turned out. Hundreds—yes, thousands—of bolts are made in this way at the present time. The great wants of the trade, however, are supplied by the aid of machines, one of which we give a sample of in the engravings published herewith. It has often been urged that machine-made bolts and nuts are deficient in strength; that the heads were imperfectly formed, and that the hand-made bolts were far superior. These objections are true of some machine-made bolts, and were prominent defects in the first ones. We have, however, seen samples of the work done by these machines, and it could not be excelled. The heads are perfect, the angles and corners are as sharp and complete as any planed nut, and the material used is, we are informed, the very best.

Machine-made bolts are all upset on the heads—that is to say, the end of the rod is pressed into the die that forms the head, so that it is all one solid piece. Hand-made bolts of any size are made with a head lapped and welded on them, and there is just the same difference between the strength of the two kinds as between a solid-headed pin and one formed of a coil, as they were formerly.

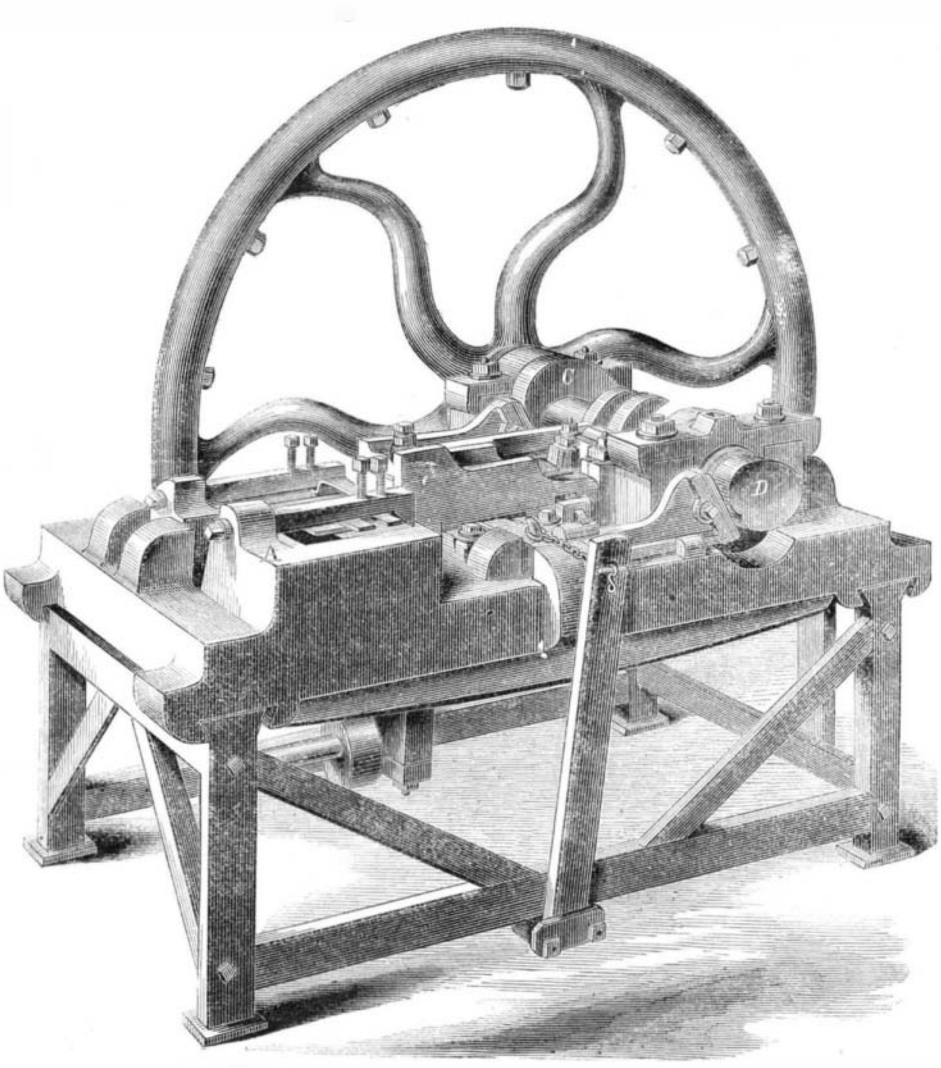
The details of this machine are simple, as will be seen. They consist of a pair of dies and a cam movement to cut off the rod and compress it to form the head. [See next page for plan view of machine.]

The die box is shown at A, in Fig. 1, and also the ram, B, which compresses the rod. The cam, C, gives the power for the purpose. At D is the cam which returns the ram to its position for another stroke. The whole is mounted on a strong cast-iron bed plate, secured to a wooden frame. This machine will make spikes, rivets, and bolts, of any size and shape of head. Its proportions and workmanship are good, and its general arrangement such that it can be easily kept in order.

The aim, says the inventor, has been to produce a machine of a simpler form and cheaper construction than those generally in use. In this he claims to have succeeded. Bolt makers and practical men all know that, in most cases, when a bolt fails, the weak point is found to be directly under the head, whether the work be done by machinery or by hand. Many machines make a good bolt, but deprive it of all its strength in releasing it from the dies. This objectionable feature, it is claimed, has been entirely avoided in this machine, by so arranging the movements that every bolt made from good iron will be found perfect in all respects.

This machine was patented October 11, 1864. For further information address White & Butterworth, Box 292, Baltimore, Md.

[See advertisement on another page.]



HARDAWAY'S BOLT AND RIVET MACHINE.

New Theory of Iron.

In a paper addressed to the Academy of Sciences, M. de Cazancourt, a proprietor of ironworks, expounds a new theory of iron. Oxides of iron, he observes, have long been considered to be degrees of oxidation of one and the same metal, always appearing under a metallic form with absolutely identical characteristics, whenever chemically pure. Hence all the difference met with in various kinds of iron are exclusively attributed to peculiar chemical composition, and they are universally classed under three heads, viz., cast iron, steel, and wrought iron, according to the quantity of carbon they usually contain. And yet certain kinds of cast iron, identical in their chemical composition, appear so different from each other, and give such opposite results in working them, that our author thinks it necessary to distinguish them in practice. On the other hand, there are sorts of cast iron presenting the same composition as certain kinds of steel, and there exist also certain sorts of steel that, if analysis is to be trusted, are not distinguishable from certain kinds of iron. Hence, in metallurgy, the chemical composition of various sorts of iron is a matter of mere secondary importance, and the real characteristic to be taken into account, according to the writer, is the degree of oxidation of the ore from which they have been extracted. Berzelius had, ere this, laid down the theory, that there were two sorts of iron metals, to which he respectively gave the names of *ferricum* and *ferrosum;* M. Cazancourt adopts this division, which represents iron under two allotropic states, just as is the case with sulphur and phosphorus. He, therefore, calls ferrosum the metal extracted from the protoxide of iron, and this, he says, has not yet been practically obtained in a state of purity, except in laboratories, through the reducing agency of hydrogen. The nearest practical approach to it is what is called bright iron, possessing great hardness and fragility. The quality of iron derived from the anhydrous peroxide is what our author calls ferricum. It yields malleable iron, but when alone is not convertible into steel any more than into bright iron. The common sorts of foundery iron are nothing but ferricum losing a part of its carbon, which it had absorbed under the influence of a high temperature.—*Galignani.*

[When we consider the extremely minute quantity of phosphorus that will materially affect the properties of iron, we cannot avoid suspecting that the differences observed are, after all, due to the presence in one case, and absence in the other, of some unobserved substance.—EDS.]

OUR NATIONAL FINANCES.—We have received from the author, who signs himself "A Patriot," a pamphlet of 47 pages, on the national finances, printed by Baker & Godwin, of this city. The author is manifestly ignorant of that rudiment of his subject—the distinction between capital and currency. He imagines that the printing of $100,000,000 in paper currency will increase the capital of the country to this extent, and will reduce the rate of interest to three per cent per annum!

THE manufacture of silk was more than one thousand years in traveling into England from the shores of the Bosphorus. It had been practiced four hundred years in Italy before it crossed the Alps.

Extraordinary Submarine Adventure.

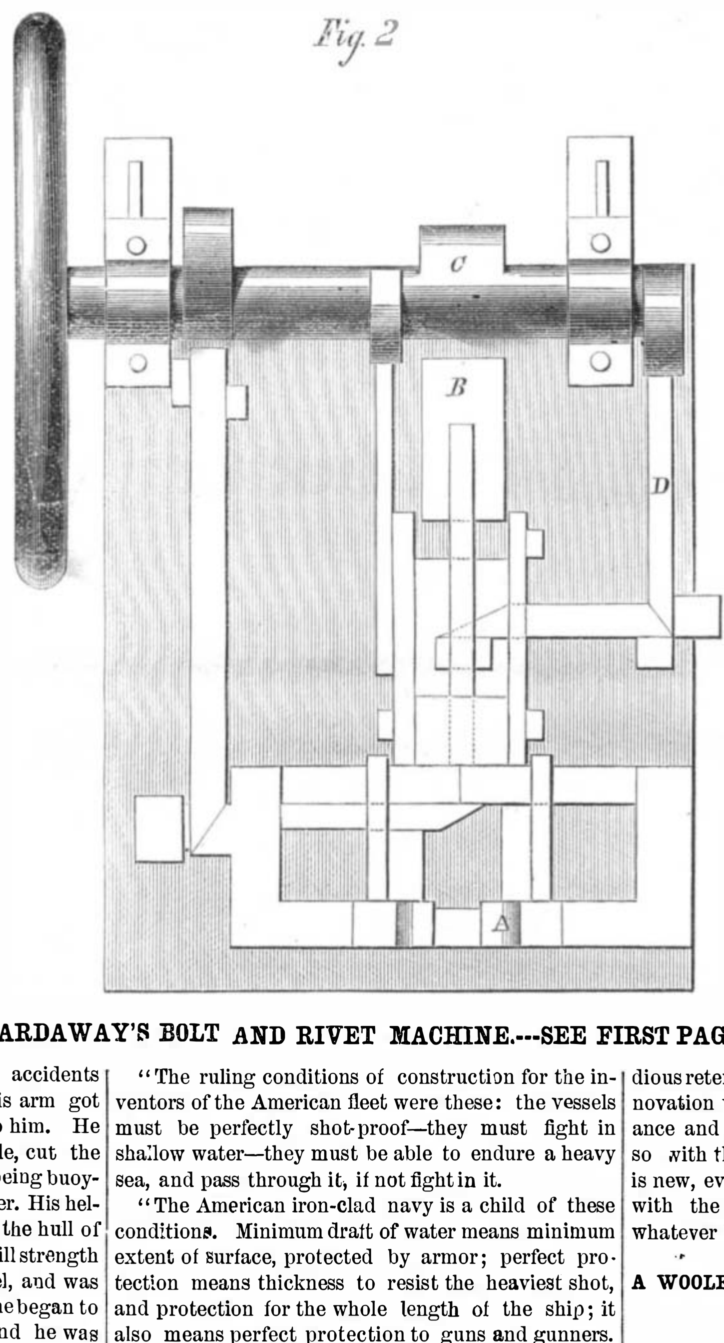
The following has been posted at Lloyds' in reference to the sunken wreck of the *Columbian*, screw steamer, belonging to Liverpool, which unhappily foundered with all hands during the dreadful gales off the coast of France. She has a cargo on board valued at £50,000, and extraordinary efforts, it will be seen, have been made to recover it by means of divers. It forms an interesting illustration of the difficulties encountered in conducting submarine operations.

"On Thursday, the 31st of August, the *Flambeau* sailed from Molene, found the *Columbian*, and anchored over her. The ladder (which I had got made at the dockyard) was lowered, with a pig of iron at each side of its end. The diver went down, stopping at each tenth step to signal that all was going on well. As he descended he found the pressure increasing to a most painful degree. When on the last step he found the ladder was too short, the wreck being 10 or 12 feet deeper than the pilots had reported (they had stated its depth to be 29 fathoms—174 English feet). The ladder was 60 meters—197 feet—long from the top step to the lowermost one, from which the diver let himself down 10 or 12 feet below the pigs of iron. The electric lamp had been let down; but the pressure was so great that, although made of strong copper, with strengthening bars inside, it was bruised quite flat. The diver could distinguish the steps of the ladder, and even the fine line holding the lamp. He walked forward about twenty steps, sinking ankle deep in sand, and was then suddenly seized with a dizziness, and nearly fainted. He made his way back to the ladder, and made the signal to be hauled up. It was not perceived on board, but the people on deck, feeling uneasy at having no signal, hauled him up rapidly. The forcing pump not being sufficiently strong the air could not be sent down regularly, and the air tubes had burst. The pressure at the bottom was so great that none but such a man as this diver, who is built like a Hercules, could have withstood it. The scaphander was torn and bruised; the under garment, of strong caoutchouc cloth, was rent in several places, and its seams imprinted in the diver's flesh. The pressure on his belly was so intense as to force out his water against his will. After three-quarters of an hour's rest, and the forcing pumps and air tubes being repaired, the diver went down again. He had walked only a few steps from the ladder when the same accidents recurred. In getting back to the ladder his arm got entangled in one of the ropes attached to him. He unscrewed his dagger knife from his side, cut the rope, and was shot up with great velocity, being buoyed up by the air contained in the scaphander. His helmet struck, with a stunning blow, against the hull of the *Flambeau*, close to her keel. He had still strength enough to push himself away from the keel, and was floated to the surface, on reaching which he began to sink. Fortunately a boat was at hand, and he was picked up, brought on deck, and was taken out of the scaphander apparently dead. It was more than half an hour before he came to, after continued frictions of camphorated brandy and ether. He then slept soundly for an hour, and on awaking wanted to re-descend, but neither M. Werdermann, M. Carvallo, nor the lieutenant would allow him. I asked M. Carvallo what were his conclusions after this trial? His answer was to the following effect:—" I am certain that at a depth of 40 meters (131 feet) all salvage may be carried on without any danger. Even at 50 meters (164 feet) it may be done if proper precautions are taken; but beyond that depth the danger is too great. I have therefore made up my mind. My company abandons the salvage of the *Columbian*, and I shall leave this for Paris to-morrow morning. M. Werdermann and the diver called on me seperately yesterday evening. Both are still of opinion that the salvage is possible, but with better apparatus and more effective means, all of M. Cabirol's scaphanders and apparatus (which were those used) having been by far too weak. With powerful means, which they themselves would superintend the making, they would not hesitate to dive to the *Columbian*, and feel certain of success."—*London Engineer.*

An English Ship Builder on the Monitors.

Mr. J. Scott Russell says of "the modern American fleet:"—

"It is a creation altogether original, peculiarly American, admirably adapted to the special purpose which gave it birth. Like most American inventions, use has been allowed to dictate terms of construction; and purpose, not prejudice, has been allowed to rule invention.



HARDAWAY'S BOLT AND RIVET MACHINE.---SEE FIRST PAGE.

"The ruling conditions of construction for the inventors of the American fleet were these: the vessels must be perfectly shot-proof—they must fight in shallow water—they must be able to endure a heavy sea, and pass through it, if not fight in it.

"The American iron-clad navy is a child of these conditions. Minimum draft of water means minimum extent of surface, protected by armor; perfect protection means thickness to resist the heaviest shot, and protection for the whole length of the ship; it also means perfect protection to guns and gunners. Had they added what our legislators exact, that the ports shall lie in the ship's side, nine feet above the water, the problem might at once have become impossible and absurd; but they wanted the work done as it could be done, and allowed the conditions of success to rule the methods of construction.

"The conditions of success in the given circumstances were these: that you should not require the sides of the ship to rise much above the water's edge; that you should not require more protection to the guns than would contain guns and gunners; that you should be content with as many guns as the ship could carry, and no more.

"But the consequences of these conditions are such as we, at least for sea-going ships, would reluctantly accept. The low ship's side will, in a seaway, allow the sea to sweep over the ship, and the waves, not the sailors, will have possession of the deck. The American accepts the conditions, removes the sailors from the deck, allows the sea to have its way, and drives his vessel through, not over the sea, to her fighting destination by steam, abandoning sails. The American also cheerfully accepts the small round turret as protection for guns and men; and pivots them on a central turn-table in the middle of his ship, raising his port high enough to be out of the water, and then fighting his gun through an aperture little larger than its muzzle.

"By thus frankly accepting the conditions he could not control, the American did his work and built his fleet. It is beyond doubt that the American monitor class, with two turrets in each ship, and two guns in each turret, is a kind of vessel that can be made fast, shot-proof and sea-proof. It may be uncomfortable, but it can be made secure. The sea may possess its deck, but in the air, above the sea, the American raises a platform on the level of the top of his turrets, which he calls his hurricane deck, whence he can look down with indifference at the waves fruitlessly foaming and breaking themselves on the abandoned deck below. His vessel, too, has the advantage, as he thinks it, of not rolling with the waves; so that he can take his aim steadily and throw his shot surely. Thus, if he abandons much that we value, he secures what he values more.

"I think I have reason to know that the American turret ships, of the larger class, with two turrets and four guns, are successful vessels; successful beyond the measure of our English estimate of their success. Like so many American inventions, they are severely subject to the conditions of use, and successful by the rigidity and precision with which they fit the end and fulfill the purpose which was their aim.

It is certain that Captain Ericsson rendered great service to his country by inventing at once, and successfully introducing a class of vessels peculiarly suited to action in their inland waters and shallow navigations; and when we consider the extreme rapidity which attended the execution of the project, we must say that the original *Monitor* was a remarkable success, and that she was a type of an entirely new class of war-ship. It is curious and instructive to observe how differently the system has been developed in America and in England: in the one case the sudden abandonment of all the conventionalities of a ship, and in the other the studious retention of old forms and ways, admitting the innovation with the geatest possible amount of reluctance and seeming aversion. But it is almost always so with the Americans, who love a thing because it is new, even without any other recommendation, and with the English, who begin by hating a novelty, whatever be its merits."

A WOOLEN FACTORY OPERATED BY CHINESE WORKMEN.

We are informed by a gentleman from San Francisco that there is in that city a large woolen manufactory in which all the laborers employed except the overseers are Chinese. The wages paid average about a dollar a day, the hands boarding themselves, but dwellings being furnished by the employers. They are said to be very apt in learning to attend the machines, and very diligent and faithful in the performance of their labor.

The wool worked is of California growth, all grades being produced in abundance. The goods manufactured are heavy broadcloths and other styles adapted to that market. Some of the blankets are claimed to be equal to any made in the world, being of very fine wool and so heavy and of such quality as to command twenty-five dollars apiece in market. The business is said to be enormously profitable, and the works are being rapidly extended.