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IRON-CLAD FRIGATES—BENDING THEIR ARMOR PLATES.

The steam frigate *Roanoke*, which is now in the Navy Yard, at Brooklyn, has been razeed, and is being converted into an armor-clad turret war ship. She is to be clothed amidships with thick iron plates, which are to extend about five feet below the water-line; and she will have three great revolving gun turrets on deck, and a powerful iron beak or ram on her bow. This beak resembles a huge ax, and is formed of plates twenty feet long, four and a half inches thick, thus making nine inches of iron on the front edge. Each of the revolving gun turrets will be twenty feet inside diameter, and the sides will be formed of eleven courses of inch-iron plates. These plates are laid over and riveted to one another in such a manner as to "break joints," and vertical plates are also bolted to several courses so as to secure the whole in the most rigid and perfect manner. These gun towers, for the *Roanoke*, are now being constructed at the Novelty Works, in this city, where the plates for them, likewise those for the armor, are bent to the proper curves. Each plate for a turret is about nine feet in length by forty inches in width, and an inch in thickness. Two courses of rivet holes are punched out in each, and they are all bent cold in a powerful hydraulic press. The bed plate of the press is of a concave form, and the top block is of a convex form. A plate to be bent is placed upon the concave bed plate of the press, and when properly adjusted the pump forces up three rams under it, and the plate is reduced to the proper curve against the top block. The pressure to which each plate is submitted, to give it the proper curve, is three and a half million pounds. By this method of bending the turret plates cold, there is perfect uniformity and accuracy secured for the whole. The turrets for the *Roanoke* will be of a superior character, but only six courses of plates have as yet been laid on two of them.

The bending of the thick plates for the ram, and also for the sides of the frigate, is quite a different and difficult operation to perform, compared with those of the gun towers. Each of these plates has to be bent to the proper curve to suit its own particular place on the vessel, and not only the broad side but the edges also must be bent to suit the particular curves. The bending operations are under the charge of Mr. George Bonniwell, an intelligent young shipwright. All these plates are of hammered iron, and are furnished by several companies, in Pennsylvania, New York and Massachusetts. When they arrive, they resemble huge straight iron slabs, varying in length from eleven to twenty-two feet, and in breadth, from twenty-two to twenty-four inches, and their average thickness is four and a half inches. One of eleven and a half feet length weighs about 4,240 lbs; one of twenty-two feet length, for the ram, weighs over four tuns. Such masses of iron are difficult to move about, and the operations connected with bending them are necessarily tedious and troublesome; and they require great care and skill to conduct properly. Of course, it is impossible to bend such masses of iron cold, hence each plate is first heated to nearly a white heat in a long furnace, shaped somewhat like a baker's oven, with a movable arched cover. The press for bending is quite different from the one used for the turret plates. Outwardly it resembles a long, strong iron screw press, used for pressing woolen cloth. Its top block, or platen, is moved up and down, but its bed is fixed and very solid. A Dudgeon hydraulic jack at each end supports, and moves the top block up and down. The bed, upon which the heated plate is laid, is formed of a series of adjustable boltster blocks, each of which is capable of being set by a screw to any desired hight on either side, and at any desired angle to suit the bend to be given to a plate which is compressed between the descending top-block and the adjustable bed. A plate is first placed in the furnace, and it is then raised to nearly a white heat. The cover of the furnace is now raised by a block and tackle, and the plate is then seized by a powerful crane, secured on a carriage. The heated plate is now lifted, the crane carriage moved back, and the plate swung around and placed in the press, where it is perfectly adjusted to obtain the proper curves. The huge top-block is then forced down, squeezing the great mass of iron into the desired shape. In about half an hour, the plate has acquired a permanent set, and it is taken out, ready to have its edges planed, when it is fit for bolting to the frigate. The bolt holes in these plates are all drilled. It requires a large number of men to move such great heavy masses of iron, and from the time a glowing plate is lifted out of the furnace until it is secured in the press, the scene is one of extrordinary activity and excitement, as the plate requires to be placed in the press as expeditiously as possible before it becomes cool. The metal of these plates appears to be first class; but until within a few days past they were furnished very slowly by the different contractors. The plating of the *Roanoke* will now proceed with greater rapidity; still she will not be finished for several months to come. We were told that this frigate is expected to obtain a speed of about ten knots per hour. If she makes nine knots we shall be agreeably disappointed. As the *Roanoke* will sit very low in the water, we hope that proper arrangements will be made for ventilation on the main deck. The defects of the *Galena* and *Monitor*, so clearly pointed out in the SCIENTIFIC AMERICAN of last week, by an intelligent correspondent, will be reproduced in the *Roanoke*, rendering her very deficient as a "sea-boat," unless this advice is heeded.

THE TRUE REMEDY FOR THE SCARCITY OF CHANGE.

As the Government is issuing more currency than there is a natural demand for in the community, its value necessarily declines. Gold is quoted at 15 per cent, premium, which simply means that our currency is at that discount. It is one of the inexorable laws of trade that currency will flow to a level in all of the countries in the world; no community can have for any considerable time more than its share, and none can have less. If $300,000,000 is the amount which naturally falls to the lot of the United States, from the present amount of our wealth and of our business transactions, and from the present supply of specie and paper money in the world, then it is impossible to increase the value of our currency much above 300,000,000. If we issue 600,000,000 of Government notes, making them a legal tender, they will fall to about 50 per cent.

The effect of a depreciated paper currency is always to drive out of the country all currency of greater value. This has been tried fully in Sweden, Russia, France and other countries, and the gold and silver always disappeared. In Sweden, so great was the drain of precious metals, that even copper in bars was exported. The effect is inevitable, because it results from universal principles of human nature.

The excessive issue of Treasury Notes is the greatest blunder which it was possible for the Treasury Department to commit, for a debasement of the currency deranges, not merely commerce and trade, but all of the industrial operations of the community. Every man at work for wages is now receiving some 15 per cent less than he contracted for, and all existing contracts are impaired to this extent. This may not be immediately apparent, but it will soon manifest itself in a general advance of nominal prices. Men working for a dollar a day will soon find that they can buy only 85 cents worth of merchandise for the piece of paper that is called a dollar; and if the issue of Treasury Notes continues, one of these same pieces of paper will bring only 50 cents worth of any commodity. It is true the grocer will still sell a dollar's worth of sugar for a paper dollar, but his dollar's worth will be 7 pounds instead of 14.

The true and best remedy for this evil is for the Government to return to a specie currency, laying tax enough to support its expenses. The tax, however severe, would be less burdensome than this paralysis of all operations by the destruction of the currency. But if they have not nerve enough to adopt this effectual remedy, the evil may be palliated to the extent of providing change to circulate with the depreciated paper, by simply issuing coin debased to the same extent as the paper. Let our silver coin remain at its present weight, but be made of an alloy 20 per cent cheaper, and it will not be shipped abroad in the settlement of foreign exchange.

COATING THE HULLS OF IRON SHIPS.

The necessity of providing an American navy iron-clad vessels, is felt and being acted upon by our naval authorities. There is one evil connected with iron ships which demands the attention of scientific and practical men, namely, their liability to become foul by barnacles adhering to the plates below the water line. Wooden vessels were once subjected to the same evil, but the discovery that copper and brass sheathing prevented the adherence of shell fish, ultimately afforded a complete remedy. Neither copper nor brass sheathing, however, can be applied directly to iron, because, when these metals are brought into contact with iron in water, a galvanic action results, and the positive metal—iron—is decomposed with great rapidity. The hulls of all iron steamers are painted, but the common paints used for this purpose do not afford sufficient protection, hence such vessels have to be frequently placed in dock and their bottoms scraped. But this frequent docking is not the only evil, for when the hull of a ship becomes foul its resistance in the water is greatly increased, and it becomes difficult to steer, while, at the same time, its speed is also diminished. The speed of an iron steamer in tropical waters, has been reduced by fouling from twelve to seven knots per hour, after running but one year. It is, therefore, apparent that the expense of running iron steamers is greatly increased on account of their bottoms becoming foul, and that a perfect preventive, of a simple character and not too expensive, is of much importance. In England, a great deal of serious attention has been devoted to this subject, but not so much in America, because all our vessels, hitherto, were constructed of wood. Now, however, as we are entering upon a career of iron shipbuilding, this subject demands thorough investigation, and a series of experiments should be undertaken, and continued until a complete remedy for the evil is discovered.

We learn by Mitchell's *Shipping Journal*, that Mr. R. Mallet, Civil Engineer, London, has made many experiments with iron in contact with other metals and substances, and the following interesting statements were made by him at a meeting of the United States Institution:—

"Iron in water not exposed to air, he had proved by experiments, never corroded. Iron in contact with platina does not corrode. The estimated rate of corrosion of average iron was $\frac{6}{10}$ths of an inch, spread over a century, from natural causes. Iron could be protected in the mass by zinc, in the proportion of 120 square feet of iron to 1 square foot of zinc. Dutch metal, which is an alloy of 4 atoms of copper to 1 of zinc, was very good, for a vessel so coated was relatively as 49½ to 84. Corrosion is also influenced by the quality of the metal. Common bolt plates corrode in a given time in a ratio of 36, whilst the best scrap was only 2½. He cited this as a proof that the quality of the metal had everything to do with the deterioration. As to protection from animalcules, he said, that oils or any fatty matter were a preventive, but unfortunately grease would not adhere long enough to be effective. He had kept shellfish in water to test the effect of metallic poisons. He discoved that by commencing with small doses of sulphate of copper, oysters would live on a fluid that would poison a man. He had run a penknife into an oyster thus dosed for a couple of years, and the blade came out coated with copper. He inferred therefrom