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THE QUALITY OF IRON PLATES.

The great advancement made in the useful arts during the present century is chiefly due to the more extended employment of iron. It is the foundation upon which the useful arts rest, because it is the principal metal employed in the fabrication of tools, machinery, and works of civil and mechanical engineering. The present age is distinguished for its vast production of iron. In 1740 the total amount of iron made in England was 18,000 tuns. Forty-eight years later, 1788, it had only increased to 70,000 tuns, but last year (1861), it was no less than 4,150,000 tuns. In 1771, about 7,500 tuns of iron were made in the American colonies, half of which was exported. In the year 1861, about 900,000 tuns were manufactured, but, instead of exporting, about 300,000 tuns were imported. The great development of the iron manufacture in England is due to inventive genius and acquired skill. Incessant attention has been paid to improve the processes of manufacture, and large sums have been expended by associated capitalists and men of science, in making experiments. There are almost numberless varieties of iron, each possessing peculiar qualities, and each adapted for a specific purpose. Pig iron, steel and wrought iron, are three distinct varieties of the same metal, but for practical purposes they are distinct metals. And in these three distinct classes of iron there is quite a variety of qualities. Their respective peculiarities are believed to be due to admixtures of foreign substances, but this is an intricate question, involved in much obscurity. As it relates to their respective qualities, however, in connection with their adaptability for different purposes, we have more information. Thus pig iron is the raw material, of which cast, malleable, wrought iron and steel are made. But it is stated that most of the varieties of iron have depreciated in quality, both in Europe and America within the past twenty-five years, by the general application of the *hot* in place of the cold-blast in smelting ores. A higher heat being obtained with the hot than the cold blast, more injurious impurities, it is alleged, are fused and combined with the metal than formerly. The more general use of mineral coal in place of wood charcoal in smelting, it is also charged, has tended to depreciate the quality of the metal now manufactured. With the vast increase in the amount of iron manufactured, and the many improvements made in producing it at less cost and in larger masses than formerly, it has not been improved in quality. Various considerations prompt us to direct special attention to one point in this connection.

We have just started upon a new career in the manufacture and application of iron plates for shipbuilding purposes, and care should therefore be exercised that we start aright. In the manufacture of armor plates, for example, the metal best suited for the purpose should be chosen, and all others rejected. Now, as there are so many varieties of wrought iron, the best to use can only be determined by experiment. Mr. William Fairbairn, F.R.S., who has conducted many experiments in this connection, asserts that the tough wrought iron made from clay iron ores is the best for this purpose, and should be exclusively employed. And in connection with the selection of the best iron for this purpose, the hammering and the rolling operations to form thick plates must be conducted with skill, or the very best iron may be rendered worthless. It has been found that after a certain number of heats—not exceeding six—the best wrought iron depreciates in strength by every subsequent heating and hammering. In fabricating such plates, therefore, they should be finished with a very few heats. At present the demand for certain qualities of iron plates cannot be supplied with sufficient promptness, and for many years to come it is probable that all the powers of our large rolling mills and forges may be taxed to furnish an adequate supply. It is not only the navy but the mercantile marine which is now beginning to draw so largely upon our iron manufacturers for plates in steam shipbuilding. The safety of life and property, and the national reputation, all demand that the utmost attention should be bestowed upon the production of plates of superior quality first, then quantity afterward.

THE WORTHLESSNESS OF OUR FORTS.

In a recent visit to Fort Richmond, at the southerly entrance of this harbor we observed that the barbette guns are being mounted, and that they are of small caliber. Now, it has been repeatedly demonstrated in the course of this war that for the protection of the city of New York, with its enormous stores of wealth, Fort Richmond might just as well be armed with fowling pieces.

We have been inclined to agree with the officers of the Engineer and Ordnance corps of our army in the opinion that our sea-coast fortifications would be found effectual in preventing the entrance of hostile fleets into our harbors; but this opinion was always based on the supposition that the forts were to be armed with very heavy cannon and garrisoned by artillerists so trained that they could strike a passing vessel at nearly every shot. We still think that if Forts Richmond, Hamilton and Lafayette were fully supplied with 15-inch guns, and if every gun was manned by artillerists who had practiced with it till they had learned the proper elevation at every point across the channel, it would be impossible for even an iron-clad fleet to work its way through the Narrows. But this opinion is merely an *à priori* conclusion, resulting from a course of reasoning, and may be blown to the winds by the first experimental trial.

At all events, the passage of the Mississippi forts, and the repeated running of the Vicksburg batteries, have conclusively shown that a fleet of even wooden vessels might sail into this harbor in broad-day light past the forts at the Narrows, while the attempt of these forts to prevent the passage of an iron clad fleet in the night would be ridiculous.

If a single French or English frigate were lying in the harbor with its shell guns trained upon the city, would not our banks very quickly pay the thirty-five millions of gold in their vaults to prevent a bombardment? And would it not be cheaper, as well as more manly and agreeable, for our citizens to advance the money to the General Government, first to ascertain whether the large guns could prevent the passage of an iron-plated ship, and if it was found that they could, then to have these guns cast and mounted in the forts?

POROUS WATER-PROOF CLOTH.

This quality is given to cloth by simply passing it through a hot solution of weak glue and alum. This is what is done by paper makers to make writing paper, the very thing which constitutes the difference between it and blotting paper, only on cloth the nap like the fur of a beaver, will preserve the cloth from being wet through as the rain will not adhere but trickle off as soon as it falls, and moisture will not adhere at all.

To apply it to the cloth, make up a weak solution of glue and while it is hot add a piece of alum, about an ounce to two quarts, and then brush it over the surface of the cloth while it is hot, and it is afterward dried. Cloth in pieces may be run through this solution and then wrung out of it and dried. By adding a few pieces of soap to the glue the cloth will feel much softer. Goods in pieces may be run through a tubfull of weak glue, soap and alum, and squeezed between rollers. This would be a cheap and expeditious mode of preparing them. Woolen goods are prepared by brushing them with the above mixture, first in the inside, then with the grain or nap of the cloth, after which it is dried. It is best to dry this first in the air and then in a stove room at a low heat, but allow the cloth to remain for a considerable time to expel the moisture completely. This kind of cloth, while it is sufficiently waterproof to keep out moisture and rain—being quite impervious to water—is pervious to the air. Many fishermen know that by boiling their pants, jackets, nets and sails in a pot with oak bark and fish skins, and afterward drying them, they become waterproof. The composition mentioned above is of nearly the same nature as the fish glue and oak bark, and consequently the same effects are produced. The composition is stated to be improved by adding about one-fourth the quantity of the sulphate of copper to the alum. Cloth made waterproof in this manner will resist the effects of water even if it is somewhat warm, but it loses its waterproof properties if boiled. Persons who are exposed to the inclemency of the weather will find it to their advantage, as a means of preserving health to prepare their clothes in the way we have described. Several corps in the French army are provided with porous water-proof cloth tunics prepared in a similar manner. They have been found very beneficial when the troops are in active service.

COAL—ITS COST AND SUPPLY.

Coal is the grand agent of mechanical power for driving machinery, and it may also be ranked among the prime necessaries of life. It has almost become as essential to the sustenance of life, in winter, as the food we eat. Every effort, therefore, should be made to procure it in abundance, and at the lowest possible cost. As there are no natural supplies of coal in New Jersey, New York and New England, the manufacturers, steamboat proprietors and citizens in these States are chiefly dependent upon Pennsylvania for this fuel. The great expense connected with it is its long inland transportation by railroad and canal. Coal which is sold at the mines in Pennsylvania for $1 50 per tun, is sold for no less than $5 50 in New York; and we learn from the report of Mr. Thatcher Perkins, Master of Machinery of the Baltimore and Ohio Railroad, that the cost of coal per tun on the Parkersburg Branch is only seventy-five cents. Along the valley of the Ohio, from Wheeling to Pittsburgh, the best bituminous coal is obtained for about $1 per tun, while in New York and Boston the same quantity of coal cannot be obtained for less than $6 and $7. Anthracite coal is $1 50 per tun higher in price in our sea board and inland cities this year than it was in 1861. This rise is attributed to an increase in miners' wages, and a decreased amount sent to market, on account of breakages in the canals, and injuries to railroads sustained by freshets. Miners' wagers have been very slightly increased; the principal cause of the rise in price, we believe, is an increase in the rates of freight. For the fruits of the field we are dependent upon sunshine and showers, and as man cannot control these, there will always be fluctuating supplies of food. But it is very different with our mineral fuel; it exists in unlimited quantities, subject to the industry of the miner. Several millions of our people are deeply interested in obtaining a supply of coal at moderate and unfluctuating prices. As coal is one of the great items of constant expenditure in many manufacturing operations, our Eastern manufacturers are perplexed in making contracts when they cannot depend on the prices of fuel. The question is also very frequently asked, "Cannot coal be obtained in our sea-board cities for less than about five times its cost in the vicinity of the mines in Pennsylvania?"

These statements and questions are of general interest. If it is possible, and we believe it is, to improve the facilities for carrying coal from the mines to our distant cities and hamlets, so as to reduce the expenditure of transport, and thus reduce its price to consumers, an enlightened self-interest should prompt those who have the abilities to make the effort to accomplish such a desirable result.

A NEW large tubular bridge has lately been completed on the Berne and Lausanne Railroad, near Friburgh, in Switzerland. Including the abutments, it is 1,290 feet long; the tube weighs 1,200 tuns, and the piers are 260 feet high.