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Iron Bridges.

Since the fall of the Wheeling Suspension Bridge, articles have appeared in a number of our daily papers condemnatory of iron as a material for such structures. Some of these articles evince considerable ability, and in one which appeared in the "Washington Star," signed "Engineer," the question is discussed with good judgment, and scientific knowledge. The conclusion at which the author arrives, with respect to the use of this material for bridges, is, that in the absence of the necessary skill, both in the manufacture of the proper iron, and in the scientific arrangement of the parts of the different kinds of iron, so as to give each the office best suited to its properties, it would seem most prudent to build either of stone altogether, or with stone piers and wooden superstructure.

In speaking of those properties of iron which chiefly contribute to its strength and utility, —its elasticity and tenacity, he points out a fact in connection with its elastic quality, to which, too little attention has been paid by engineers, in its use for resisting strains and supporting weights, that is, the difference between its elastio and tensile power. Thus he says, "a weight of 8½ to 11 tons suspended to the end of a bar of wrought iron, of a square inch section, will overcome its elasticity; while 24 to 26½ tons similarly suspended, are necessary to overcome its tenacity, or to produce disruption of the bar. Hence we see that the elasticity of the wrought iron may be destroyed, long before disruption would ensue, and long before the ordinary observer would discover that any change had taken place in the bar, or in any structure of wrought iron."

This is true, and will account for a great many accidents connected with iron bridges, steam engines, &c., which have been pronounced "mysterious."

Metal in a state of rest, although sustaining a heavy pressure and strain, as in a beam or brace, and exhibiting only the deflection due to the superposed weight, will continue to bear that pressure without fracture so long as its rest is not disturbed, and the *same* strain not too frequently repeated. But by frequent changes of pressure or strain on iron, a certain disturbance of its particles takes place, the metal deteriorates, and suddenly, when not expected, the very same strain or weight which it had oftentimes supported, or resisted, will break it to pieces. Iron of the lowest degree of elasticity, is the easiest broken by frequent deflections, whether caused by concussions, or rolling heavy weights on it.— Thus if we take two pieces of iron wire, possessing different elastic powers, the least elastic will break by being bent and rebent sooner than the other piece; but, at the same time, every person is aware of the ease with which any iron wire can be broken by bending and rebending. It soon becomes as brittle at the bending point as a piece of glass. How different from a piece of whalebone, or india rubber. Here, then, is the very quality which should be looked to in iron for building bridges, as such structures are subject to continual concussions, deflections from heavy rolling bodies, and oscilations, from severe gales of wind.

There can be no doubt, in our opinion, but the breaking down of so many iron bridges in our country, can be traced to the bad quality of iron used in their construction—it did not possess sufficient elasticity.

The deteriorating effects of fatigue on iron, by which it so often fractures suddenly, has been proven by the fall of the iron bridge on the New York and Erie Railroad three years ago, and a number of other iron bridges in various parts of our country. In view of these facts, we must conclude that iron has not hitherto been safely used for many bridges.

But are wood and stone, not equally with iron, subject to deteriorate, by fatigue, concussions and strains? They are; but long experience has made engineers better acquainted with their application, and this is the very point to which attention should be especially directed by engineers in the application of iron, namely, a knowledge of its powers for the purposes to which they wish to apply it. Iron combined with carbon in certain proportions— some kinds of steel—is the most elastic material known to us, and it will maintain this quality for a long period, and endure more fatigue than any other known substance. All iron is iron, just as all wood is timber; but there are just as many varieties of the former as of the latter, and yet, how small is the amount of knowledge possessed by the most experienced engineers of the different kinds of iron, in comparison with wood. Let civil and mechanical engineers look more to the quality of the iron which they use for various purposes, and the community will not be so oft en inflicted with painful accidents on sea and land, from the bursting of boilers, the fracturing of the shafts and beams of engines, and the breaking down of iron bridges.

Alcohol without Re-Distillation

Some week's since the announcement was made in the journals of the day, and also in a paper read before the American Association for the Promotion of Science, that a method had been devised at the Patent Office for obtaining pure alcohol from whisky without distillation or heat. The discovery, it was stated, was accidental, and in this wise:—"A gentleman had a quantity of whisky in a cask five feet high; on drawing it off, he discovered that the upper part of it was much stronger than that near the bottom. The hint was taken; and now we prepare our alcohol by putting whisky into a tall column, and allowing it time for the heavier parts to subside, and we find pure alcohol at the top."

At the first thought this may seem to many as a very pretty and useful discovery, but a moment's consideration given to the composition of alcohol, will show its utter and entire fallacy, and at the same time demonstrate its value to be on a par with Paine's wonderful discovery of the carbonization of hydrogen by passing a current of the same through cold spirits of turpentine.

Anhydrous alcohol consists of four atoms of carbon united to two of oxygen and six of hydrogen, the whole represented by the formula $C.^4 O.^2 H.^6$. Anhydrous alcohol, as such, does not occur naturally, but can only be formed artificially. It exists naturally combined with water, and this combination is always a chemical combination, and not a mechanical one; and we might as well expect that water confined in a long narrow column would separate into its component elements—oxygen and hydrogen, in virtue of their different specific gravities (the former being eight times heavier than the latter,) and thus allow the hydrogen to be drawn off pure at the top, as to expect water and alcohol would thus arrange themselves. Indeed, such is the affinity of alcohol for water, that no amount of distillation, cooling, or condensation, is sufficient to entirely separate the two bodies, a tenth part of the water always remaining after every distillate. In order to procure it absolutely anhydrous, a body must be presented to it which has a greater affinity for water, and which fixes it so firmly that it cannot evaporate with the alcohol at the boiling point of the latter.

The gentleman who had the quantity of whisky standing in a cask five feet high, undoubtedly found the alcohol, after a time, stronger at the top than at the bottom, and if he had been better posted in chemistry, would have referred the matter to its true cause rather than to the ridiculous one of difference in specific gravity. Thus, if a quantity of brandy or alcohol be put into a bladder, and be exposed to a warm temperature, the aqueous portion of the spirit will pass through the membrane in preference to the alcohol, and in this way the spirit will be made stronger.— Smugglers who carry spirits about their persons in bladders, are aware of this fact, and their customers also, as they always prefer the smuggled to the legitimate article, on account of its being stronger than ordinary spirit. This change which we have described takes place in accordance with the well-known laws of exosmosis, and in the case of the whisky in the barrel, the wood, and particularly the head of the barrel, being the highest portion, played the part of the membrane, and gradually withdrew a portion of the water of the whisky. As long as the whisky was kept at rest the stronger portion would naturally float at the top. We think a good thick coat of paint, closing effectually all the pores of the wood, would essentially modify the experiment.

Defective Steamships.

Our army—as well as our navy—seems to be inflicted with government mismanagement in almost all that is done respecting steamships. The sad disaster of the "San Francisco" steamship, on her first voyage, with U. S. troops, involved other consequences than those of suffering and death at that time. The commanding officer has been dismissed from the army for misconduct on that occasion, and Major Wyse, who since then was ordered to embark with his troops on the "Falcon" steamer, has been court-martialed, and suspended for disobedience of orders, he having refused to embark with his soldiers, because he considered the "Falcon" unseaworthy. It so happened that, the "Falcon" on the very voyage in which Major Wyse refused to go on board, proceeded only about forty hours on her passage, when she was compelled to put in at the nearest port, in distress. This was owing to a defect in the valves of her engines. The testimony adduced on his trial consisted chiefly of opinions respecting the sea-worthiness of the "Falcon"—the quality of her hull, engines, &c. Very strong testimony was presented to show that the vessel was unsafe, and unfit for the transport of troops and passengers, and that of C. H. Haswell, of this City, Engineer for the New York Underwriters, although he considered the machinery good and safe, admitted that vessels were often used to carry passengers that would not be used for carrying freight. Respectable witnesses of good authority, gave testimony in favor of the engines; while other testimony equally good—showing how different persons take different views of matters—was presented against the steamer. From an examination of the evidence, we are of opinion that Major Wyse placed himself in a delicate position—sacrificed himself in a measure, from patriotic motives. While he is the immediate sufferer, apparently, his action will do good, and the very Court Martial that sentenced him, by their decision, almost admit that he was justified in what he did; for they censure the conduct of those who hired the "Falcon." It is not for us to discuss the abstract right or wrong of that sentence—such a question is not within the legitimate sphere of our duties—but we do say, that the miserable steamships which have been employed by our government for various purposes, touch the feelings of every true American. The engines of the "Falcon" might have been the best in the world, but they certainly were not in order for that voyage. The said engines were constructed for the "Iron Witch," a *steamboat* projected by Capt. Ericsson, about fifteen or sixteen years ago, and which failed of suooess. With repairs and modifications they were transferred to the "Falcon," and, we are informed, "worked well;" but we presume they are better adapted for summer than winter voyages, on a stormy sea. We sincerely hope that more attention will hereafter be paid to the choice of steamships for transporting troops, than has hitherto been done. That Major Wyse's conduct will contribute to this result, we have no doubt; for it is the prevailing opinion that it was wrong to order him with his men to make a voyage in that vessel.

A Noble Inventor

In our list of patents this week there appears the name of the Earl of Dundonald. As but few of the titled aristocracy of any nation have been distinguished for inventive qualities, the singularity of the circumstance provokes us not to pass over in silence our new titled American patentee. Thomas Cochrane, Earl of Dundonald, is a most extraordinary character, and has taken out perhaps fifty patents in England during his lifetime. Some of them have been worthless and some very useful. Lord Brougham said of him once, "he was one of the most extraordinary mechanical geniuses that ever lived." He is a British Admiral, as well as an Earl, and for nautical skill, bravery, and genius, he never had a superior in that navy. He distinguished himself while very young in the early part of this century, in some desperate enterprizes on the coast of France; after that he was dismissed from the navy and deprived of his knightly honors, for some alleged disreputable speculations on the London Stock Exchange. He then left England and became an adventurer for a number of years, in commanding a fleet of one of the South American Republics, then fighting for independence. A few years ago it was found out that he had been deprived of his knighthood and expelled from the British Navy upon false and frivolous accusations, and he was then restored to more than his former rank and honors. His present title is one of heir-ship, he having succeeded his elder brother, who died without issue.

City Subscribers and the Carriers.

For several months past we have experienced great difficulty in obtaining faithful carriers to serve the "Scientific American" in this city and Brooklyn, and the complaints from our patrons of the non-receipt of their papers week after week, has become so annoying that we have resolved to discontinue serving the paper in the city by carriers entirely. No doubt many faithful newspaper carriers serve the paper to their patrons properly, with other periodicals, and it is not that class with which our arrangement will at all interfere, but it is those carriers who have been entrusted with the *office subscribers* that this arrangement will effect.

After this week's issue, those of our city subscribers who have paid their subscriptions in advance at the office of publication, will receive their papers by Boyd's Dispatch Post, enveloped in a wrapper and the postage pre-paid, until such time as their subscriptions expire, after which they may be furnished at the counter of the office of publication each week, or obtain the paper at any of the periodical depots in this city, Brooklyn, or Williamsburgh.

We believe nearly all the periodical depots have the "Scientific American" on sale, and our patrons will be better served and get their papers in better time, and in a better condition than heretofore, while we hope to be relieved of the annoyance of constant complaint about the non-receipt of the paper, which our city patrons have of late had just reason for making.

All that have paid for the paper at the office and still get their paper irregularly by the new arrangement, will oblige us by sending word to the office, giving their place of residence anew, and they shall be attended to.

More Blind Communications.

Some one has sent us a sketch and description of an improved repeating pistol. The letter lacks town, county, and State, and also the writer's name, therefore we cannot answer it. We are sorry to be compelled to caution our correspondents so often against such gross mistakes. In a few days, probably, our *incog* correspondent will write complaining of not receiving such attention as we bestow upon others. This is often the case, and to say that it is annoying, is using the mildest language we can think of just now. Correspondents—do be careful in future, and give us all necessary directions,—write plain and to the point, and avoid unnecessary prolixity in statement; this will please us very much, and aid us greatly in coming at once at the very core of the subject, besides insuring a prompt reply.

The Wheeling Bridge.

We judge from the Wheeling papers that no arrangements for the rebuilding of this bridge have yet been matured. The "Gazette" thinks a suspension bridge for the use o locomotives impracticable. The erection of piers, and the construction of a truss draw-bridge is suggested as the most practicable method.

The Bill for granting the renewal of Moore & Hascall's patent for a Reaping Machine, wa rejected in the Senate on the 16th inst.