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Iron Steamships.

The loss of the steamship *Arctic*, by collision with the small iron steamer *Vesta*, which safely arrived in port; and the more recent loss of the *Pacific*, believed to have struck an iceberg, while the *Persia* did the same, and escaped almost uninjured, have been the means of attracting public attention in this city towards the safety qualities of iron ships.

As some of our daily papers have just been discussing the matter in a loose way—all of them seemingly being possessed of the notion that iron ships, built with bulkheads, are of but very recent origin—a brief history of their rise and progress will be of general interest.

From the *London Mining Journal*, we learn that John Neilson, an engineer, of Glasgow, and brother of the inventor of the "Hot Blast," issued a pamphlet in 1827, for the formation of a company to build ships of plate iron, and he pointed out their superiority over timber-built ships. Before that period he and others had built small iron vessels for canals; and he had thus acquired a practical knowledge of their advantages. He failed to form a company, but he laid down the keel of one 110 feet long in his own yard in 1828, completed it in 1830, and named it the *Fairy Queen*. It resulted in loss to him, but in gain to the public, for it claimed the attention of skillful engineers, and in 1833 a moderate sized iron steamboat, named the *Kilmunn*, was launched in Glasgow, and surpassed all others of her tunnage, both in beauty of model and in speed. After this, small iron steamers became common in Scotland, but it was not until 1839 that one of large dimensions was built, this was the *Royal Sovereign*, constructed by Todd & McGregor, builders and proprietors of the *Glasgow* and the *Edinburgh*, iron screw steamers, which trade between this port and Glasgow.

At that time there was a strong public prejudice against iron ships; they were believed to be more unsafe than timber ones, but the success of the *Royal Sovereign* dissipated all these ideas, and large iron steamers then began to multiply.

Glasgow is the chief city in Europe for steamship building. In 1853–4, no less than 250 iron steamships were built there—some of them of great size.

Nearly from their very origin, all iron steamships have been built with water-tight compartments, yet the *New York Tribune* lately stated that this method of building vessels is quite new, and that nautical engineers are ignorant regarding their construction, and that they do not know the strength of metal required for the compartments, according to the water pressure to which they may be subjected. This is certainly a mistake. The makers of iron ships (and indeed skillful engineers who never built one,) can easily calculate the exact strength of metal required for every bulkhead. The art of iron ship building is as well understood, and perhaps better, than that of wooden ship building. Iron steamships are more safe than timber ones: the principal material of which they are composed is incombustible, therefore they are not soliable to that most terrific of all calamities, "burning at sea." All our ferry and river passenger steamboats should be built of iron; we should at least—as we stated last week—like to see them compelled to have their boiler rooms encased with iron, and constructed in the same manner as fire-proof safes. Iron can resist collisions of any kind better than timber. If by accident, however, a hole should be stove in the hull of an iron vessel, it is more difficult to plug up or stop, than such a hole would be in a timber-built vessel, hence there is a greater necessity for having such vessels built in compartments, to prevent their filling and sinking suddenly, when damaged in the hull. Many iron ships, however, have been lost, although built in this manner. A few years since the *Orion* iron steamer was lost on the coast of Scotland from striking a rock; it sunk very suddenly, and a great number of passengers were drowned The *City of Glasgow*, iron steamer, left Liverpool for Philadelphia, about three years ago, and never was heard of more; it is believed she struck an ice berg. And no further back than the 18th of last month, the iron steamer *Curlew* struck a rock on the coast of Bermuda, and soon sunk; the passengers and crew, however, were all saved. We might mention many other cases to show that iron ships are not perfectly safe any more than timber ones, but those cited are sufficient. A timber-built vessel, however, if subjected to the buffetings of the *Great Britain*, when wrecked in Dundrum Bay, would have gone to pieces, yet that vessel is now a regular packet to Australia, and is nearly as sound as when first launched.

We also find it stated, on page 112, Vol. 10, *London Artisan*, that the chief surveyor of Loyd's, on an examination before a Government Committee, gave it as his opinion, in the case of the *Nemesis*, an iron steamer that struck a rock and was saved, that had it been a wooden vessel, and had struck in the same way, it would have been totally lost.

One great objection against iron ships, is their liability to attract the magnet or compass, and thus deceive the navigator in steering on his true course. The compasses of the *Great Britain*, it was said deceived the captain; and in 1853, the *Tayleur*, a fine new iron ship, was wrecked on the coast of Ireland, and the compasses were also blamed for this. Timber-built vessels are not subject to this danger; which is one advantage in their favor.

It has been stated that iron ships are not liable to be struck by lightning. but this is not correct, for W. Snow Harris mentions several cases of iron vessels having been struck.

In England iron ships can be built for about fifteen dollars less per tun than timber ones; and with the same outside measurement, an iron ship of 1800 tuns burden will carry 300 tuns more than a timber-built vessel.

The last number of the *Nautical Magazine* recommends iron bulkheads for wooden steamers, and it also states that the planking of a ship is its main safeguard from foundering. Iron plates, then, have immense advantages over wooden planks for the outside covering of ships; their edges can be made with flanges fitting snug into one another, and which, when rivetted, makes the whole hull tight as a steam boiler, and far more of a homogeneous whole than it is possible to make the hull of a timber vessel.

No iron ship has yet been built in our country, although there have been a few small iron steamers. But as ship timber becomes more scarce and dear, iron will be resorted to as a substitute; and it is a pleasing reflection that the art of iron ship building is ready made to our hands. No vast outlays of money will have to be made in experiments: they have already been made on the other side of the ocean, and we have their results before us in the construction of such steamers as the *Persia* and *Edinburgh*—the latter, in our opinion, being the most beautiful model of the two. Such vessels are not perfect, and no doubt our nautical architects and engineers will make improvements on them.

In science and art the whole world is now a republic; we learn from other nations, and they learn from us: there is a fraternity of interests and feelings among the men of science and art belonging to all nations; and their motto is, "improve and progress."

Silver and its Uses.—No. 1.

This is the whitest, and next to copper the most ancient metal. It is capable of receiving a most brilliant polish, and it reflects light and heat better than any other metal; hence a silver tea-pot is superior to that of any other metal for retaining the heat of tea. Silver ranks next to gold for ductility and malleability. It is harder than gold, still, it is easily cut with a knife; hence, a small portion o. copper is mixed with it in making silver articles of common use, so as to render them harder and more durable. Next to iron and tin it is the most common metal used for domestic purposes. Silver can be volatized between the charcoal electrodes of a powerful galvanic battery, and when it is fused in an open vessel it absorbs about twenty times its own bulk of oxygen, which it again expels in the act of solidifying. It possesses the excellent property of not tarnishing in the atmosphere (unless in some situations where it is exposed to sulphretted hydrogen gas,) and for this reason it is well adapted for the shields of door-knobs, door-plates, &c.

Its chemical name is Argentum, its symbol Ag. It exists native in a pure state, as a sulphuret, as a chloride (horn silver) and is found combined with gold, lead, antimony, arsenic, &c. In the Copenhagen Museum there is a native lump of silver weighing 500 pounds which was found in Norway. It is often found in iron rocks, but at Lake Superior it is found associated with malleable copper. The native sulphuret is found in the form of crystals of a shining lead grey color. It is very fusible, and is one of the most common and richest of silver ores, being especially abundant in the Mexican mines. The chloride of silver is a rich ore, and is most abundant in the Chilian mines; it is often accompanied with masses of pure silver. The bromide of silver is found in large quantities in the district of Plataros, Mexico A large proportion of the silver of commerce is extracted by amalgamation from the argentiferous ores. The ores are mixed with ten per cent. of common salt and roasted in a reverberatory furnace in which the heat is raised gradually for the first two hours, to drive off the moisture, then it is raised to and continued at a red heat for four hours, when it is raised to a still higher temperature for about an hour, to decompose the salt. The roasting is now complete, and the charge is now raked out of the furnace, cooled, and passed through sieves. The lumps are then mixed again with salt and receive another roasting, after which they are cooled and ground to powder in a Chilian mill. The powdered roasted ores are now placed in a wooden barrel with 30 gallons of water to every 1000 lbs. of ore, and 100 lbs. of scrap wrought iron about one inch square. The barrel is then rotated or else a stirrer is placed inside, and the whole contents of the barrel stirred for about two hours. About 500 lbs. of mercury are now added, and the revolutions kept up for 16 hours, during which time the charge is often examined to add water, if required. The amalgamation of the silver with the mercury is generally completed in 18 hours, when the barrel is filled up with water, rotated about ten times, and left to stand for a few minutes, when the amalgam is drawn off, by a tap, into a proper vessel, and then squeezed through canvas bags to remove the surplus mercury. The remaining mercury is driven off by distillation, and the silver is afterwards obtained pure by cupellation. This is an expensive process for obtaining silver. No works for thus reducing it have yet been erected in the United States, so far as we know, but in North Carolina silver is obtained from ores by the smelting process, by the Washington Mining Company. The ore operated upon is chiefly brown sulphuret of zinc mixed with galena, copper, and iron pyrites, gold and silver, &c. The ore in lumps is roasted in the open air, then crushed to powder by stampers, and washed to carry off the oxyd of zinc and quartz. The roasting is never considered complete until all the zinc is converted into the soluble oxyd to be washed away. The reason for this is, that if any zinc were left it would carry off some silver and gold in the smelting operation. The ore when deprived of its zinc is smelted in a reverberatory furnace with charcoal powder, and is exposed to a current of heated air until the base metals are all oxydized and skimmed off, and the pure unoxydizable gold and silver left. This process is also tedious, but not so expensive as the amalgamating.

On page 88, this Vol. Scientific American, the process of Pattison for obtaining silver from lead ores is fully described, as is also the refining process, which is illustrated with a figure. Our lead ores are not treated for the small amount of silver they contain; and the copper of Lake Superior also contains too small an amount to be treated for its Argentum; valuable pieces of pure native silver, however, are sometimes found in these mines.

The Mexican and South American silver mines are the richest in the world, but a considerable amount of silver is also obtained from the mines of Spain, Germany, Sweden, Norway, Russia, India, China, and Australia It is believed that there is plenty of silver in California, but hitherto it has not attracted much attention; there is a "good time coming," however. The lead ores of England yield a considerable quantity of silver—about 25 tuns per annum of pure silver.

To Steamboat Inspectors.

We really hope that none of the Inspectors appointed under the New Law are becoming careless and untrustworthy, or so satisfied with their last years' vigilance as to consider they have laid up a store of good deeds to make amends for future delinquincies.

The charge here implied has an appearance of being founded on facts. Two steamboat explosions have already taken place on our western waters since the commencement of this year. The steamer *Belle* recently exploded her boiler on Sacramento river, Cal., and the steamer *Metropolis* exploded hers on the 27th ult. at West Columbia, on the Ohio river, by which three persons were instantly killed and five dangerously scalded. This accident has been attributable to a defect in the metal of the boiler, which is stated to have been tested by the hydrostatic pump, and to have withstood 210 lbs. pressure before she started on her last trip from Pittsburg to New Orleans. It is also stated that the steam in the gauge when the explosion took place exhibited only 110 lbs. pressure, and two sheets only in the center of the boiler was all that was torn away. There was no deficiency of water in the boiler, and no evidence of any sudden great increase of steam at the time of the accident.

We hope the Inspectors will do their duty in both the cases mentioned, and make a thorough examination into the causes of these explosions. It shows there must have been something wrong and not accounted for in this case, if the boiler exploded under 110 lbs. steam pressure and yet withstood 210 lbs. pressure a few hours before from the Inspector's test. A rigid inspection cannot be relaxed if the Inspectors desire to maintain their reputation, and execute the sacred and responsible duties of their office faithfully.

Recent American Patents.

Steam Whistle Blower for Locomotives—By James Harrison, Jr., formerly of Milwaukie, Wisconsin, now of New York City.—The steam whistle has come to be regarded, on nearly all our railroads, as the most effective and reliable signal of warning that can be adopted. Its invariable use is required by law in some States, not to mention the regulations of railroad companies. It is the engineer's duty to sound the whistle at every crossing, curve, bridge, &c.; but he has a great variety of other duties to perform connected with the guidance and control of the engine, fire, &c., which renders it almost impossible for him always to open the whistle at the exact moment or spot or for the proper length of time; yet safety requires that the alarm should always be sounded with the most unerring precision and certainty. The late terrible accident in New Jersey on the Camden and Amboy road is an instance in point; many other examples, less fatal to life, but highly destructive to property could be named.

Mr. Harrison's improvement consists in an attachment to the locomotive which is intended to sound the whistle at the proper moment and spot, independent of the engineer. It is a sort of mechanical watchman, always on the look out, never asleep, attention never, for an instant, diverted. At every crossing, curve bridge, station approach, locality of danger or other desired point, it sounds the alarm, and keeps up the shriek as long as needed, with a surety that it would be difficult to improve. Indeed, it is a part of the locomotive; so sure as the engine moves will the whistle be blown. The inventor provides a cylinder upon the periphery of which is a screw thread, furnished with a series of adjustable stops. The cylinder is rotated by connection with one of the truck wheels of the locomotive. The stops are arranged so as to come in contact with and lift the opening lever of the whistle. By adjusting the stops at the right distances