

## SCIENTIFIC MUSEUM.

## Nautical Architecture.

Scott Russell recently delivered a lecture in London on the Science and Progress of Ship-building, in which he paid the most decided compliment to Brother Jonathan. The following is an extract from the lecture, which will be of great interest to our readers:—

"The subject placed on the list for consideration has been suggested by the assertion which, within a year or two, has been often repeated, that our transatlantic brethren are building better ships than ourselves; that, in short, Brother Jonathan is going ahead, while John Bull is comfortably dozing in his arm chair; and that, if he does not awake speedily and take a sound survey of his true position, he may soon find himself hopelessly astern. Two questions of a practical nature arise out of this alarming assertion. 1st. Whether the Americans are really in any respect superior to the English in nautical matters. 2nd. Whether, in order to equal them, we are to be condemned to descend into mere imitators, or whether we have independent ground from which we can start with certainty and originality on a new career of improvement in naval architecture. In the outset, I beg permission to say that I am not one of those who shut their ears to the praises of our young and enterprising brethren over the water, or view their rapid advancement with jealousy. I beg to express my perfect belief in the accounts we have heard of their wonderful achievements in rapid river steam navigation. I am satisfied, as a matter of fact, that twenty-one, twenty-two, and twenty-three miles an hour have been performed, not once, but often, by their river steamboats. To that we cannot in this country offer any parallel. The next point in which they had beaten us was in the construction of the beautiful packet-ships which carried on the passenger trade between Liverpool and America, before the era of ocean steamers. These were the finest ships in the world, and they were mainly owned and sailed by Americans. The next point at which we have come into competition with the Americans has been lately in ocean steam navigation. Three years ago they began. They were immeasurably behind us at starting; they are already nearly equal to us. Their trans-atlantic steam packets equal ours in size, power, and speed; in regularity they are still inferior. If they continue to advance at their present rate of improvement, they will very soon outstrip us. Next I come to the trade which has long been peculiarly our own, the China trade. The clipper-ships which they have recently sent home to this country have astonished the fine ships of our own Smiths and Greens. Our best ship-owners are now trembling for their trade and reputation. Finally, it is true that the Americans have sent over to England a yacht called the America, which has found on this side of the Atlantic no match; and we only escaped the disgrace of her having returned to America, without any of us having had the courage to accept her defiance, through the chivalry of one gentleman, who accepted the challenge with a yacht half the size on this principle so worthy of John Bull, 'that the Yankee, although he might say that he had beaten us, should not be able to say that we had all run away.' Such then, at present, is our actual position in the matter of ships, yachts, and steam navigation; a position highly creditable to the Americans, and which deserves our own serious consideration. I propose to examine a little into the physical causes of the naval success of the Americans; but before doing so permit me to point out a moral one, which, later in the evening, you will also find to lie at the bottom of the physical causes. It is this:—John Bull has a prejudice against novelty; Brother Jonathan has a prejudice equally strong in favor of it. We adhere to tradition in trade, manners, customs, professions, humors; Jonathan despises it. I don't say he is right and we are wrong; but this difference becomes very important when a race of competition is to be run.—These preliminary remarks find immediate application in the causes which have led to our loss of character on the sea. The Americans, constantly on the alert, have carried out

and applied every new discovery to the advancement of navigation; while, with the English, naval construction and seamanship is exactly that branch of practice in which science has not only been disregarded, but is altogether despised and set aside. The American ships show what can be done by modern science unflinchingly put in practice; the English show what can be done in spite of science and in defiance of its principles. . . .

It appeared, from the comparison which was instituted between the construction of American and English vessels, that the American ship-builders have gained over the English chiefly by the ready abandonment of old systems and the adoption of the true principles of science and the most modern discoveries. They have changed their fashion of steamers and ships to meet new circumstances as they arose. For river steamers they at once abandoned all the known sea-going forms, and created an absolutely new form and general arrangement both of ship and machinery. We, on the other hand, subject to the prejudices of a class, invariably attempted to make a river steamer as nearly as possible resemble a sea-going ship propelled by sails. We were even for a long time so much ashamed of our paddle-wheels that we adopted all sorts of inconvenient forms and inapt artifices to conceal them. The fine sharp bows which the wave principle has brought to our knowledge have been adopted in this country with the greatest reluctance; and those who adopt them are often unwilling to allow that they are wave-bows, and would fain assert that 'they always built them so,' were it not that the ships' lines are able to speak for themselves. The Americans, however, adopted the wave bow without reluctance, and avowed it with pleasure the moment they found it give them economy and speed. In like manner, the Americans having found the wave bow or hollow bow good for steamers, were quite ready to believe that it might be equally good for sailing vessels. We, on the other hand, have kept on asserting that, though we could not deny its efficacy for steamers, it would never do for vessels that were meant to carry sail. The Americans, on the contrary, immediately tried it on their pilot-boats, and finding it succeed there, avowed at once, in their latest treatise on naval architecture, the complete success of the principle; not even disclaiming its British origin. To prove to ourselves our insensibility to its advantages, they built the America, carried out the wave principle to the utmost, and, despising the prejudices and antiquated regulations of our clubs, came over and beat us. The diagrams and models which were exhibited showed the water-line of the America to coincide precisely with the theoretical wave line. In one other point the Americans had shown their implicit faith in science, and their disregard of prejudice. Theory says, and has always said, 'sails should sit flat as boards. We have said, 'they should be cut so as to hang in graceful waves. It has always been so; we have always done it.' The Americans believed in principle, and with flat sails went one point nearer to the wind, leaving prejudice and picturesque sails far to leeward. In other points, the Americans beat us by the use of science. They use all the refinements of science in their rigging and tackle; they, it is true, have to employ better educated and more intelligent men; they do so, and, by employing a smaller number of hands, beat us in efficiency as well as in economy."

[Is it true that the wave-line is the discovery of Mr. Russell? We have heard it stated a number of times that it was in practical use on many of our pilot boats and river steamers before Scott Russell published his work on the subject. Some of our naval architects can set the matter in its true light.

## Hiccup and Sneezing.

To cure the hiccup, let the person affected hold in his breath as long as possible—the non-oxygenation of the blood deadens the irritability of the nervous system so much, that, in most cases, a single trial will stop it; obstinate cases may require two or three repetitions. To prevent sneezing, let the upper lip be pressed severely, it intercepts the nervous communication so that the proper muscles cannot be called into requisition for the act; pressure

will break the circuit of nervous communication as a broken wire will stop the telegraph; it is best to press near the nose. I can confidently recommend both plans from seven years' experience. B. H. W.

On Boilers.—No. 23.

FIG. 46

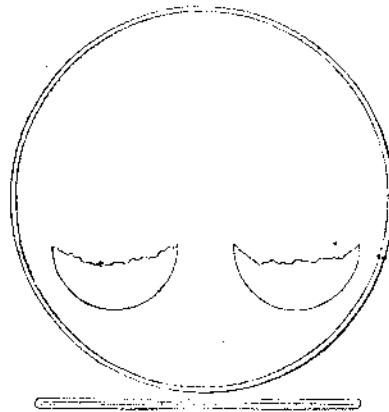
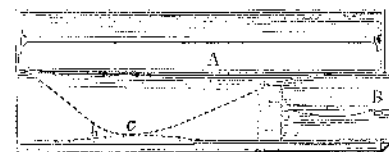


FIG. 47.

EXPLOSIONS—Alfred Guthrie, Engineer of the Chicago Water Works, Ill., has done much to be gratefully remembered by his countrymen, in examining into the causes of the explosions of boilers on our Western waters. For months did he sail up and down the Mississippi, seeing for himself, on the various steamboats, and gathering information from various engineers about the construction and management of the boilers of the boats. The results of his expensive and arduous philanthropic labors are before us, in a good-sized pamphlet, with illustrations, all of which were exhibited to us by him some time ago, on a large scale. In connection with this, we have a Bill now before us, also, which has been introduced into the Senate by Senator Davis, from the Committee on Commerce, for the prevention of explosions; the pamphlet of Guthrie has been the means of doing this. We like the Bill, and hope it will pass; it does credit to Senator Davis, for it is plain, pointed and exceedingly practical. By the pamphlet before us, it is very plain that the direct causes of so many explosions in the Western waters are, bad construction and arrangement of boilers and their appurtenances; recklessness of captains and engineers, and an over-pressure of steam—the latter might rather be a consequence of a cause, and the explosion a consequence of a secondary cause. On some of

FIG. 48.



the Western boats the pressure of steam on the boiler is very great—over 150 lbs.; the engineer himself, from the defective manner of arranging the safety-valve, often does not know what pressure of steam he carries. The collapsing of flues is very common, owing to the water getting too low in the boiler, and the top of the flues getting red hot.

Figure 46 shows the flues of a Mississippi steamboat boiler, half collapsed, and fig. 47 shows a flue wholly collapsed. The circular flues are the strongest, but there is no doubt in our minds of the improvement which would be effected if the Western steamboat boilers were made with some vertical conical tubes, like the one represented on page 264. In fig. 48, there is represented a defective flue of an oval shape, which was built for obtaining a greater depth of water over the flue, without diminishing the heating surface or amount of steam room, but in order to avoid the risk of a deficiency of water, a greater evil is to build such a flue. This figure shows the collapse of an oval flue belonging to a Cornish boiler in Newton Lancashire, which exploded in 1838. The engine was high pressure—the collapse was the cause of the boiler exploding, which was terrific—the noise was like a clap of thunder, and a number of persons were killed. The boiler, A, was 12 1-2 feet long, 4 3-4 feet in diameter, and the flue 3 feet wide by 2 1-2 deep. The top and bottom of the flue are shown crushed together, by the line b c, about midway between the further end of the boiler and the bridge. We hope none of our boiler makers will make any boilers with such a

form of flue; we know, however, that some have made boilers even of a worse form than this.

The first sample of the Irish Beet-Root Sugar was recently sold in London at 33s. per cwt., a price far below that of Colonial Sugar, and yet the Beet-Root Sugar will realize a profit to the manufacturers.

## LITERARY NOTICES.

ARVINE'S ANECDOTES OF LITERATURE AND THE FINE ARTS—This splendid book is just published by Gould & Lincoln, of Boston; it is a Cyclopaedia of the choicest anecdotes of the most celebrated characters of all nations. It is a large volume of 700 pages, and is got up in excellent style. It is a book of gems—every anecdote is a polished brilliant. The anecdotes are not of a stale shallow character, merely to make a person laugh; no, some of them reveal the whole characteristics of a celebrated singer, statesman, or poet. In fact it is a series of biographies, showing the salient points of character. Besides this, there are remarks full of wisdom and instruction, delivered by the greatest geniuses, such as Galileo, Bacon, Newton, Raphael, Angelo, Handel, Haydn, Reynolds, Burke, Scott; in short it is one of the most valuable books ever published. In it the man of science and the mechanic will find much that is valuable and useful. The section of anecdotes of authors is as entertaining as any novel. It is the best work of the kind ever published, and should find a place, as it no doubt soon will, not on the shelf of every library, but in the hands of some person in every family of our land. It is for sale in this city (N. Y.), by Chas. Scribner, 145 Nassau st.

NORRIS'S HAND-BOOK FOR LOCOMOTIVE ENGINEERS AND MACHINISTS—This is a most important work published by H. C. Baird, Philadelphia; the author is Septimus Norris, the eminent engineer in Philadelphia. Coming from such a source, it is a work which we hail as a boon to the Engineering community. We like the spirit which induced him to get up this work. He says, "I give here the result of my experience, after a study of twenty years, engaged with my senior brother, Wm. Norris, to whom I am indebted for all the information I have received relating to locomotives. He built the first locomotive in this country." In connection with his brothers he has built 530 locomotives, 170 of which are now successfully running in England and on the Continent. In this work he has given what are called "the secrets of the business," in the rules to construct locomotives, in order that "the million should be learned in all things." He presents all the rules and calculations in simple arithmetic, so that our mechanics who do not understand algebra will be able to comprehend all the formulae. There are rules of mensuration in it, and good tables of calculations. The boiler, framing, valves, and the working parts of a locomotive, are all fully described. It is a book which cannot be dispensed with by any of our intelligent engineers. It is for sale in this city by J. S. Taylor, 143 Nassau st.

CHAMBER'S POCKET MISCELLANY—Gould & Lincoln, of Boston, have commenced to issue this most excellent readable series of works, for the very low price of 20 cents per volume. The series will be issued monthly. We do not know how it is possible to publish so much good reading matter, at such a low price. We speak a good word for the literary excellence of the stories in this Miscellany; we hope our people will introduce it into all their families, in order to drive away the miserable flashy-trashy stuff, so often to be found in the hands of our young people of both sexes. It is also for sale by C. Scribner, 145 Nassau st.

LITTELL'S LIVING AGE—Number 416 of this most excellent weekly magazine, is a very excellent one. It contains articles on Lord Holland's Memoirs of the Whig Party; Anecdotes of Horace, and twelve other most able articles—the cream of European literature. It is for sale by Dewitt & Davenport, this city.

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