in the winter evenings to the cheering sound of his beloved Northumberland small-pipes.

Of the bust by F. H. Baily, for which Bewick sat in 1825, and an engraving of which is at the beginning of this paper, Mr. Atkinson writes: "Baily's bust in the library of the Literary and Philosophical Society of this town (Newcastle) is certainly the best representation of him, giving the very spirit and expression of his face, and descending to the peculiarities of the veins on the temple, the quid in the lip, and the tufts of hair in the ears." It is said that the artist wished to drape his model in the classic style; but the old man insisted, Cromwell-like, upon absolute fidelity, not merely to his coat and ruffled shirt, but to the "beauty spots," as he called them, which the small-pox had left upon his face.

It would be ungracious if this paper should close without acknowledgments of indebtedness to a few kind friends, not all mentioned hitherto, without whose aid much of it could not have been written. To Mr. Frederick Locker, for free access to his Bewick treasures; to Mr. I. W. Barnes of Durham, and Mr. T. W. U. Robinson, F. S. A., of Houghton-le-Spring, for the use of first editions and rare proofs, and for valuable information generally. Much obliging assistance has also been received from the Rev. Mr. Wray of Ovingham, and the Messrs. Ford of Enfield. Finally it should be stated that the photographs from which some of the engravings have been made, were taken, under the writer's superintendence, by Messrs. Downey, the well-known photographers of Newcastle.*

Austin Dobson.

* To this list the Editor desires to add the names of Messrs. William L. Andrews, T. Cole, W. P. Garrison, Robert Robinson, and Austin Dobson for the loan of proofs or other valuable assistance.

OCEAN STEAM-SHIPS.*

THE employment of steam as motive power is by no means a modern idea. The possibilities of steam were known to the ancients; its applications were described by Hero, 130 B. C. Roger Bacon, in the fourteenth century, made some experiments, and Blasco de Garay constructed a rude steam-boat at Barcelona in 1543. Later, Papin built a steam-boat in Germany, which was of sufficient importance to arouse the superstitious dread or conservative opposition of the bargemen, who destroyed it. Many others gave their attention to the subject, but Jonathan Hulls of Liverpool appears to have been the first to reduce the marine steam-engine to actual practice. In 1737 he published a pamphlet describing his stern-wheel boat, accompanying it with an engraving, which is yet in existence, and from which it would appear that it was capable of towing a large vessel. It is a little curious that the first form which the invention followed was that of the stern-wheel. Those who think that the first thought is the best may find confirmation of that opinion by observing that not only is the stern-wheel widely used on the rivers of the west to-day, but stern propulsion under a modified form is, after many experiments, and a long trial of lateral propulsion, the plan upon which the world has finally settled for marine navigation.

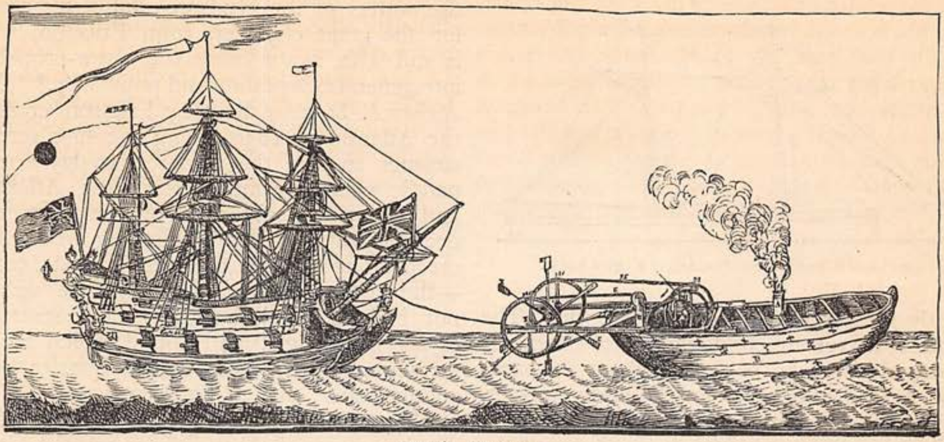
The principle of the screw propeller suggested itself early in the history of steam. At first it was attempted with a sort of Archimedean screw; but the bladed propeller was soon found to have greater efficiency. Of course, as in all great inventions, there are many claimants for the priority of invention. But although the great discoveries have generally been made simultaneously by active minds resident far apart and even ignorant of each other's existence, the fame of the invention is generally accorded to the man who first reduces the new invention to practice. Fulton has the credit of inventing steam navigation, but his boat, the *Clermont*, was a paddle-boat, the idea of which he borrowed from Symington's steamer, *Charlotte Dundas;* while two years earlier that great inventive genius, John Stevens, of Hoboken, N. J., had built a steam-boat propelled by a screw, the model of which may now be seen in the Museum of the Stevens Institute of Technology at Hoboken. Men are now living who have seen Stevens's and Fulton's boats and the *Servia*, the great Cunarder, on the waters of the river up which Hudson steered the *Half Moon* not three centuries ago.

The *Savannah* was the first steamer which crossed the Atlantic.† She was originally intended for a sailing ship of three hundred

† Some doubt seems to have been thrown on this statement. We quote the following from a communication by Henry Smith in the New York "Evening Post" of June 24th, 1882:

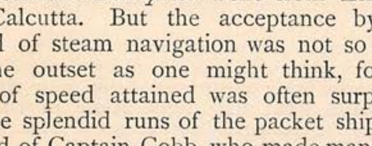
"Happening to be in Liverpool at the time of her arrival, I visited and examined the ship, machinery, etc. She was complete ship-rigged, and made no pretensions to having navigated the

* See also "The Evolution of the American Yacht" and "Steam-Yachting in America," by the same author, in THE CENTURY MAGAZINE for July and August, 1882.—ED.



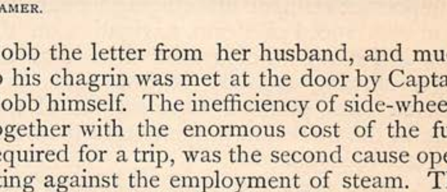
HULLS'S STEAMER.

and fifty tons, but was purchased on the stocks by Mr. Scarborough, who deserves credit as the first to send a steam-ship across the most stormy of seas. Moses Rogers was engineer and Captain Stephen Rogers was master. On the 26th of May, 1819, the *Savannah* sailed from Savannah on her memorable voyage. She arrived without mishap at Liverpool in twenty-two days. In 1825 the steamer *Enterprise* went from England to Calcutta. But the acceptance by the world of steam navigation was not so rapid at the outset as one might think, for the rate of speed attained was often surpassed by the splendid runs of the packet ships. It is said of Captain Cobb, who made many fine trips in a sailing packet, that on leaving Liverpool for New York he gave a letter for his wife to the captain of a steamer that sailed on the same day for New York. After bowling across the Atlantic to Sandy Hook at a fine



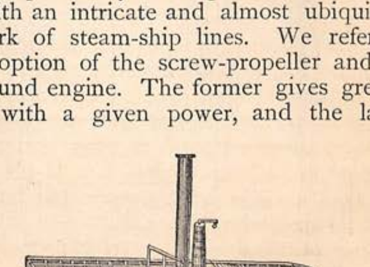
PROPELLER BUILT BY JOHN STEVENS IN 1804.

rate, he learned from the pilot that the steamer was not yet in sight. Laying his ship alongside the dock without delay, Captain Cobb went to his house and awaited the arrival of the steamer. When she, too, had anchored, her captain hastened ashore to deliver to Mrs. Cobb the letter from her husband, and much to his chagrin was met at the door by Captain Cobb himself. The inefficiency of side-wheels, together with the enormous cost of the fuel required for a trip, was the second cause operating against the employment of steam. The fine old steam-ship *Lafayette*, for example, reg-



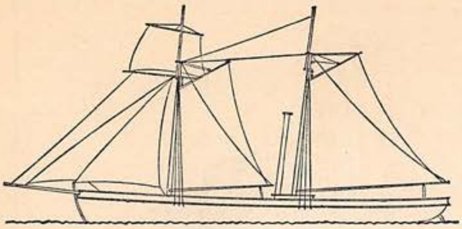
MACHINERY OF FIRST PROPELLER BUILT BY STEVENS.

istered three thousand tons; her machinery weighed nearly one thousand one hundred tons and she required upward of one thousand tons of coal. Judge what was the space left for remunerative cargo. Two great modifications in the steam navigation of the seas have within a comparatively short period covered the seas with an intricate and almost ubiquitous net-work of steam-ship lines. We refer to the adoption of the screw-propeller and the compound engine. The former gives greater speed with a given power, and the latter



PROPELLER "PHŒNIX," BUILT BY STEVENS IN 1806.

ocean by steam, and if I remember correctly, sailed all the passage, carrying her steam-engine with her as any other ship might do. At any rate, if she used her engine at all, it was too little to be of any account. She was not designed to navigate the ocean. It was not till 1833 that the subject of navigating the Atlantic Ocean by steam-power was seriously brought forward, and after years of vigorous and persevering labor was carried into successful operation."—ED.

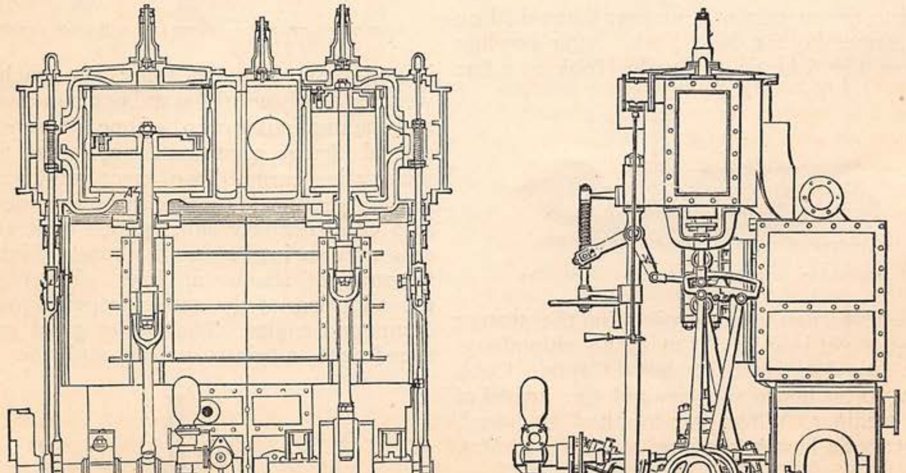


ERICSSON'S PROPELLER "ROBERT F. STOCKTON."

vastly greater power with far less fuel. The almost universal employment of iron for ocean steam-ships, beginning about the same time with the improvements in motive power, must also be considered as by no means an unimportant element in bringing forward the enormous speed of steam navigation on the seas, if for no other reason than that the larger stowing capacity of iron ships over wooden ones places a larger surplus of tonnage in the market in proportion to the steam power employed.

We have used the word "adoption" advisedly, for the invention of both the screw and the compound engine was either nearly simultaneous with or antedated the paddle-wheel and ordinary beam engine. The idea of the screw for propelling was suggested ages ago. Stevens's steamer *Phœnix* made a sea-voyage with a screw from New York to Philadelphia in 1808, seeking the waters of the Delaware because Fulton and Livingston had the patent right to steam navigation on the waters of the Hudson. But it remained for the great engineer, John Ericsson, who is still with us, to bring the screw-propeller into general acceptation and popularity.* The *Robert F. Stockton*, built by Ericsson, crossed the Atlantic in 1839, being the first screw-steamer to take the venture; to-day not a paddle-wheel steamer crosses the Atlantic, and but a few old craft of that sort, too decrepit to break up for kindling wood, still creep along the coast of the United States, —the last of their kind. Of course we do not include in this category the steamers plying on Long Island Sound, which are in no sense ocean boats. For a quarter of a century after the *Stockton* arrived in New York paddle-wheels were the fashion. The previous year (1838) the *Sirius* and the *Great Western* arrived in New York on the same day, the former from Cork, and the latter from Bristol in fifteen days, and at the very time when distinguished scientists were trying to demonstrate that it was impossible to carry a sufficient amount of coal to cross the Atlantic Ocean. The *Great Britain*, with four masts, came to New York in 1846, and excited as much astonishment as the *Great Eastern* did fifteen years after. The writer well remembers being taken on

* It is well known that the invention was pushed with such vigor that upward of forty propeller vessels, several being constructed of iron, were plying on our coasts, lakes and rivers before England was aware of the commercial advantages of the new mode of propulsion.—ED.

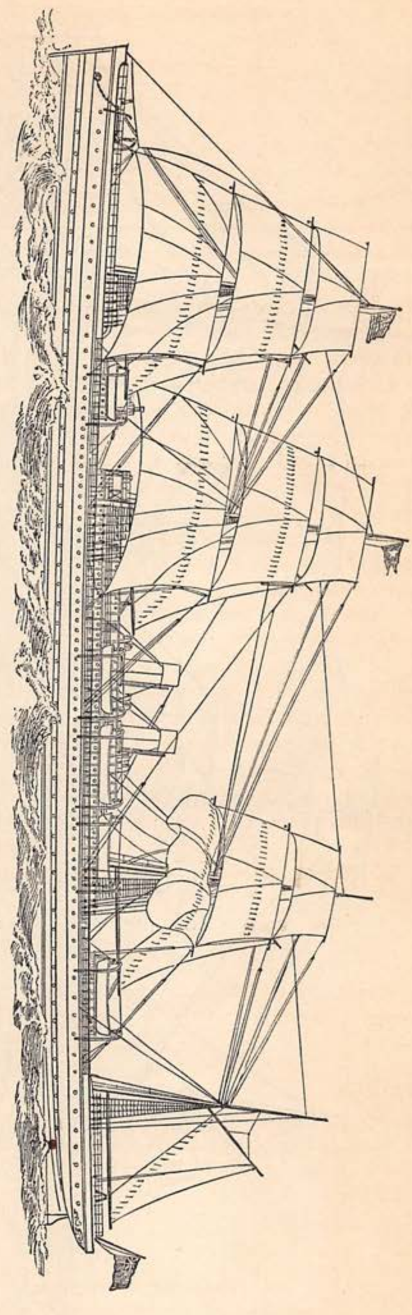


Front elevation. Side elevation.

COMPOUND MARINE ENGINE.

board by his father, and as he pushed through the dense throng of visitors, he gained an impression of size such as surpasses that produced by a sight of the much larger leviathans of to-day.

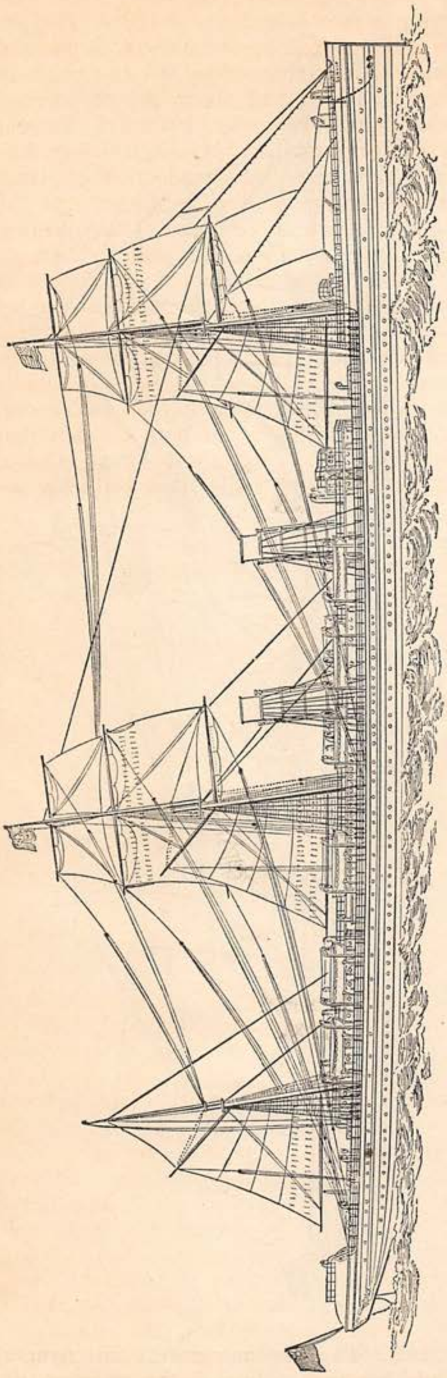
The possible value of the screw-propeller first began to be perceived and popularized by employing it as an auxiliary to sailing ships. In 1845 it was intended to establish an American line of auxiliary packet ships, but after the building of the *Massachusetts* the project was abandoned. The employment of auxiliary screws in ships-of-war in the Crimean war indicated the tentative character of all previous uses of the propeller, while it revealed the possible value of this means of propulsion and the futility of any half-hearted use of the propeller in any service in which time is an important factor. The steam-ship lines having the greatest competition to encounter are the very ones which carry the heaviest spars; owners know that they cannot afford to dispense with them in the face of a fierce rivalry. The frequency of broken shafts has often demonstrated the value of sails and rigging in steam-ships.



THE "BRITANNIC," 455 FEET.

The adoption of the compound marine engine was another point which turned the scale in favor of propellers. The compound engine was invented by Hornblower in 1781. Allaire made such an engine for Eckford in 1825. The great feature of this type of marine engine is that the expansion of the steam is carried through two or more cylinders placed in succession; generally two cylinders are used. The loss from the liquefaction of steam is thus greatly avoided and the framing and journals are eased of the tremendous strain to which they are subjected. The surface condenser, a comparatively recent improvement, has added greatly to the practicability of the marine steam-engine. Formerly condensation was produced by passing the steam into a condensing chamber, where it was met by a stream of cold water. Since the boilers were supplied with nearly salt water, it produced an incrustation, and high pressure steam was practically unsafe. By the use of the surface condenser the steam is condensed by contact with tubes filled with a constant stream of cold water, and these difficulties are thus reduced to a *minimum*. The strain on the engines is also greatly relaxed in a storm by the delicate and beautiful invention called the marine governor, of which there are several varieties. When the stern rises as the bow plunges into the hollow of a sea, the screw loses its hold on the water and as it returns again the shock to the machinery is of the most violent nature, hazarding not only the motive power but the safety of the ship itself. The governor meets this danger by checking the motion of the engines the instant the blades of the propeller rise above the surface.

By long, persevering effort means have been devised by which the consumption of fuel has been reduced to less than half what it was twenty years ago, while the improve-

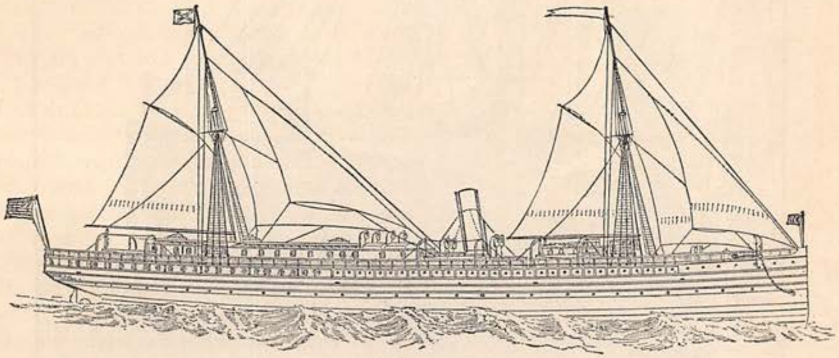


THE "SERVIA," 530 FEET.

ments in naval architecture have developed greater speed. This has brought the steam-ship at once into rivalry with the sailing vessel, which held its own longer than it would have done but for the question of expense. The results have been astonishing. The Cunard line was established in 1840 with four steamers, the *Britannia* arriving in New York July 4th of that year. The four vessels aggregated only 4,602 tons. For a decade this was the only regular steam-ship line across the Atlantic. The Collins line of American steam-ships was founded in 1850, but being dependent, like other steam lines of the period, upon a subsidy ($858,000 per annum), was abandoned in 1858. The Inman line was established about 1856. Our people are opposed to subsidies, and the tendency to corrupt and special legislation is so enormous in an active, enterprising democracy like ours, that there has been too much reason for this opposition; not, in our opinion, because the principle is a wrong one, but because it is liable to abuse. There is no question that the money judiciously expended by Great Britain in direct subsidies to ocean lines has been returned to her a thousand fold. This, however, does not involve the question of protection, which is quite a distinct matter.

We now see twelve first-rate lines of steam-packets plying between New York and Europe, besides a number of lines running to Boston, Baltimore, Philadelphia, and New Orleans, and not including a number of inferior lines whose name is legion, nor the other American coasting steamers extending as far as the Gulf of Mexico. Although the majority of these vessels are foreign in construction and ownership, the American who has seen no other part of the seas but the North Atlantic may be led to the conclusion that the steam-ship traffic of the world centers on the great circle between Queenstown and New York, and that no other fine steamers exist elsewhere. He could not make a greater mistake. Starting either from London or Liverpool and proceeding southward toward Gibraltar, one is astonished at the number of steamers he encounters. Across the Bay of Biscay they reach to the West Indies and Brazil, down the coast of Africa to the Cape of Good Hope or around the Horn, among the islands of the South Sea; or plowing through the Straits of Gibraltar and Suez, they reach to Mauritius and Bombay, Calcutta and Hong Kong. Never has there been any such ownership of shipping in the United States like that of these English, French, and Italian lines. The Peninsular and Oriental Company (the first line to adopt the screw), Lamporte and Holt's line to South America, the Wilson line from Hull, the Cunard and Anchor lines (whose North Atlantic service is but a tithe of the vast trade they carry on with the Mediterranean and the East Indies), the Moss Steam-ship Company, the Rubattino line, the French *Messa-*

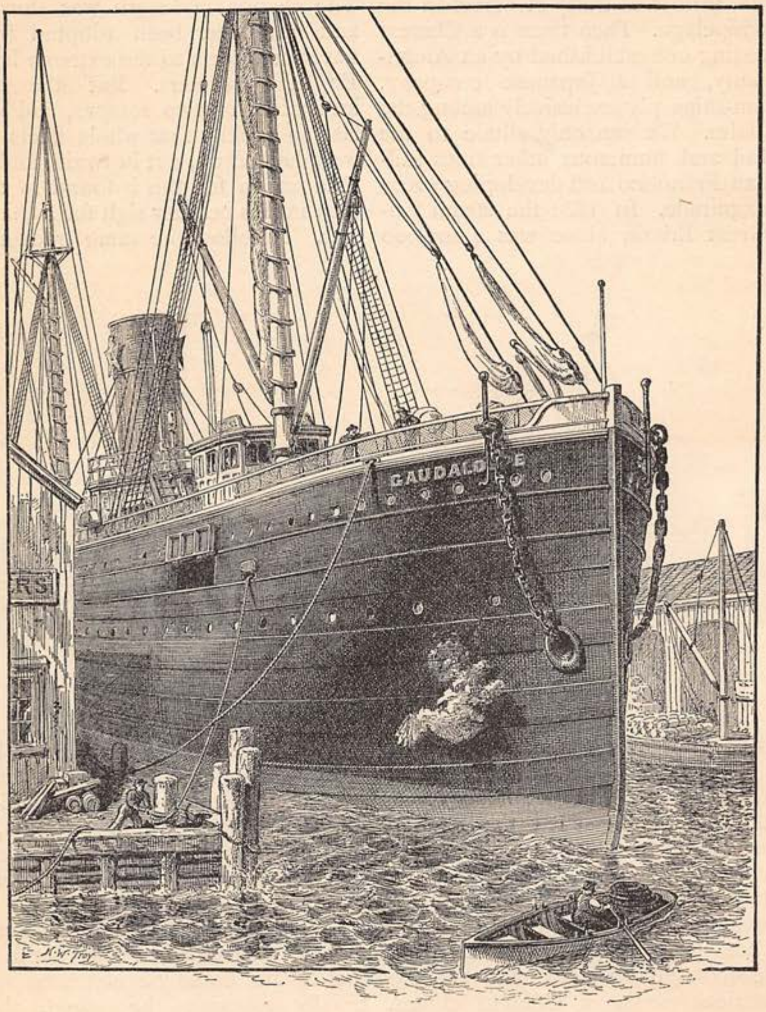
geries Maritimes—these are but a few of a host of lines which own ships by the score and the hundred. The imagination is further bewildered in considering the vast lines plying in distant seas, and never heard of in this country. There is the British India Steam Navigation Company, owning over fifty steamers, which ply between Singapore, Persia, and Zanzibar, and are manned by tawny lascars; and the Netherlands Steam Navigation Company, which maintains thirty steamers in the Indian Archipelago. Then there is a Chinese line, succeeding one established by an American company, and a Japanese company, whose steam-ships ply exclusively among the Japanese Isles. We can only allude to the Pacific Mail and numerous other lines sailing from San Francisco and developing every year in magnitude. In 1881 the steam tonnage of Great Britain alone was 4,200,000 tons. But we have said enough to suggest the vast, almost incalculable spread of steam navigation within the last quarter of a century, or since the screw superseded the paddle-wheel for ocean steam-ships.



AN AMERICAN STEAMER ("CITY OF AUGUSTA"), 330 FEET LONG.

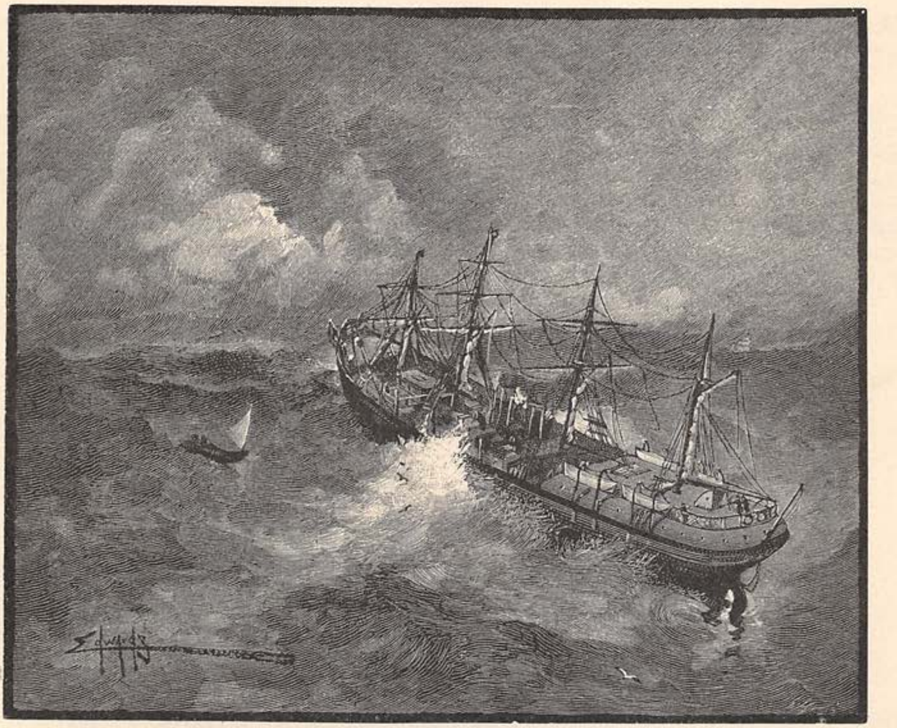
Great modifications and improvements on old models have grown out of the employment of steam and the screw, and human invention has been taxed to the uttermost to combine economy of space and expense with the various needs of different climes, or special cargoes, or the demands of a traveling public that is growing more fastidious every day. The most obvious changes in naval construction have been in the greatly elongated hull, the enormous dimensions aimed at, and the all but universal employment of iron. When the first steam-ship crossed the ocean the proportions of ships averaged three to five beams in length. The war ships of Sir William Symonds were three to four beams long. But extreme beam grew in favor owing to the sail-carrying power or stability it offers. The ancient galleys were long and narrow. A piratical galley was found imbedded on the coast of Schleswig, which had about the proportions of a modern steam-yacht. Robert L. Stevens was the first of modern builders, however, who foresaw that with the introduction of steam stability became of less moment, and he advocated a length of eight to nine beams. The change in length was slow in coming, and has never been adopted by American naval architects to the extreme limits of some English steamers. But the change was inevitable for two reasons, and came at the last so rapidly that whole fleets of steamers were hauled up, cut in twain, and pieced out. One reason for this is found in the fact that men in this century sigh for a change of some sort. To follow the same track endlessly appears like retrogression. Even a bad change is better than none, reasons the blind, unthinking public, while, on other hand, enterprise implies change. For this reason, more than because it is based on sense, there is now a reaction from this extreme form of model, for no very specific objection can be proved against it. Besides, it was discovered that with a given power and depth and beam the length could be increased without materially affecting the speed, thus adding to the carrying capacity of steam. Great length to beam, however, does not necessarily imply great speed; the speed of beamy vessels has too often been demonstrated. Fineness of lines is equally essential, together with the proper distribution of weights, and the like. The great average speed exhibited by the modern steam-ship is due in large part to the momentum of such a vast weight, which, once started, has a tremendous force in overcoming resistance.

Thirty years ago sixteen days was a fair allowance for the passage between England and New York by steam. By gradual steps the point was reached when eleven days was the minimum, and this startled the world. Then began a rivalry between the Inman and White Star lines, attended by a succession of runs showing a gradual increase of speed, which proved a great advertisement for these line, made the trip to Queenstown from New York in seven days, fourteen hours and twelve minutes, and in the same year the *Britannic*, of the White Star line, crossed from Queenstown in seven days, ten hours and fifty-three minutes. In 1879 a new rival appeared in this field, the *Arizona*, of the Guion line. This steam-ship made the eastward passage in 1880 in seven days, ten hours and forty-seven min-



BOW OF AN AMERICAN STEAMER.

lines. In 1871 the average time of twenty-four crack voyages by these lines was eight days, fifteen hours and three minutes. The *Adriatic's* best westward time was forty-three minutes less. It should be remembered that the westward passage is generally longer than in the other direction, owing to westerly winds and the Gulf Stream. In emulation of this speed in 1877 the *City of Berlin*, of the Inman utes, and in one trip in 1881 she lessened this time about three hours. This seemed to be about the best that could be expected of these superb ships, when the new Guion steamer, *Alaska*, after a number of astonishing runs, accomplished the westward passage between the two ports, on April 18, 1882, in seven days, six hours, and twenty minutes, actual time, against heavy seas. In a subsequent



TWO WAYS OF CROSSING THE OCEAN.

trip eastward she ran the distance in six days and twenty-two hours, actual time. In this, the quickest passage ever made across the Atlantic, the *Alaska* traveled 2895 knots, being about an average of 418½ knots per day, for seven successive days.* It will be observed that the increase of speed has been graduated in proportion to the gradual increase of size. The ships of 1850 were rarely much over 2500 tons, and were barely 300 feet long. Now the average length of ocean steamers is upward of 400 feet, while 500 feet is not uncommon. The *City of Rome* is 586 feet long, and registers 8826 tons; the *Servia* is 530 feet, and 8500 tons; the *Alaska* is 520 feet, and 6932 tons. The *Austral*, intended for the Australian trade, is 474 feet long and 48 feet 3 inches broad, and registers 9500 tons. The measurements of this vessel, and of the new Cunarder *Cephalonia*, which is 440 feet long by 46 feet beam, indicate that the reaction against extreme length has already commenced in the great ship-yards of Great Britain, being in each of these cases less than ten beams to the length.

Another feature of the modern steamer is the system of compartments, which may serve to stiffen the vessel and should insure safety from injury by collision, but has not proved a certain element of safety.

The bluff bow or straight stem is another peculiarity of the contemporary screw steamer. It was originated by the Americans, the great length of the modern ship obviating the necessity of a bowsprit for head-sail, and the cut-water being therefore a useless expense. The Inman line alone among prominent lines retains the cut-water and figure-head, as shown in the accompanying cut of the *City of Rome*. But it is already questioned in some quarters whether it would not be well to restore some form of cut-water, or projection, as a means of reducing the great danger now resulting from collision with the

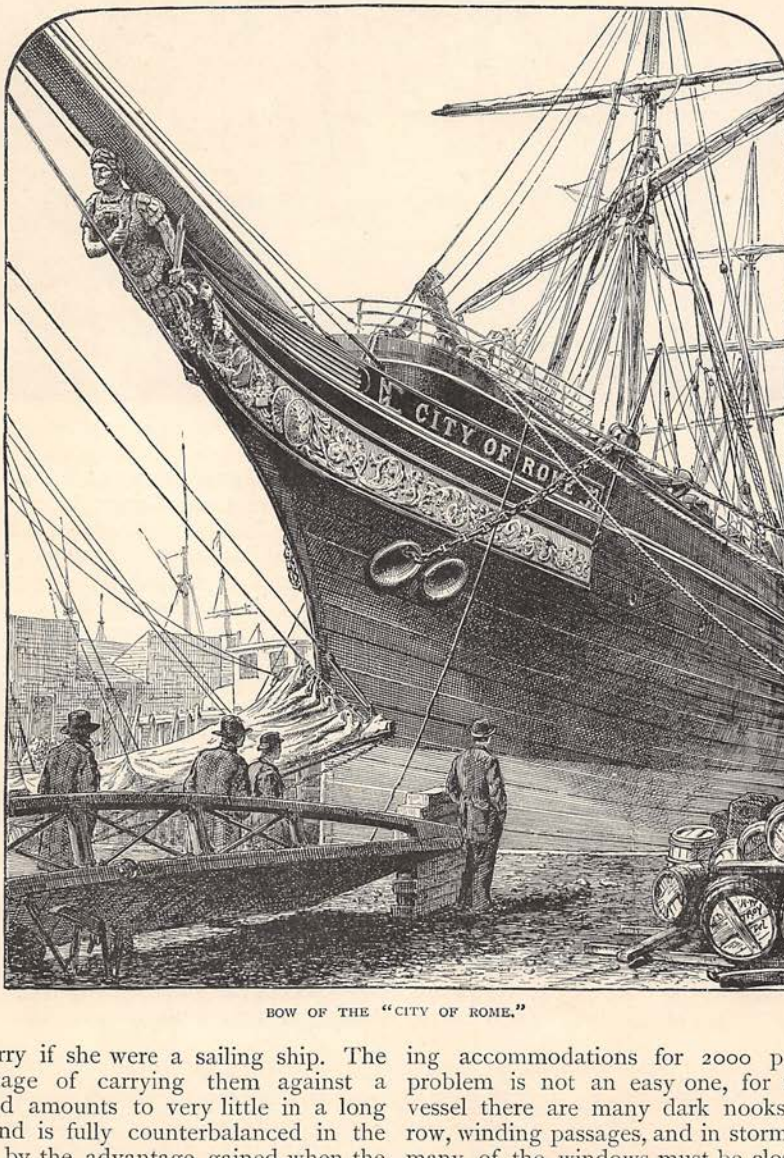
* [QUICKEST TRIPS OF OCEAN STEAM-SHIPS ON RECORD.

							D.	H.	M.
S. S. *Alaska*	sailed from	Sandy Hook	5.42 P. M., 30th May, 1882.	Arrived at	Queenstown	8.04 P. M., 6th June, 1882.	6,	22,	00
" *Arizona*	"	"	10.10 A. M., 27th Sept., 1881.	"	"	10.20 P. M., 4th Oct., 1882.	7,	7,	48
" *Servia*	"	"	5.25 P. M., 18th Jan., 1882.	"	"	5.53 A. M., 26th Jan., 1882.	7,	8,	06
" *Britannic*	"	Queenstown	4.35 P. M., 10th Aug., 1877.	"	Sandy Hook	11.06 P. M., 17th Aug., 1877.	7,	10,	53
" *Germanic*	"	"	10.25 A. M., 6th Apr., 1877.	"	"	5.40 P. M., 13th Apr., 1877.	7,	11,	37
" *City of Berlin*	"	"	7.00 P. M., 5th Oct., 1877.	"	"	4.50 A. M., 13th Oct., 1877.	7,	14,	12
" *City of Rome*	"	Sandy Hook	10.29 A. M., 22d Apr., 1882.	"	Queenstown	6.15 A. M., 30th Apr., 1882.	7,	15,	24
" *Gallia*	"	"	11.28 A. M., 4th May, 1881.	"	"	10.40 A. M., 12th May, 1881.	7,	18,	50

From Sandy Hook to Queenstown deduct 4 hours 22 minutes for difference in time.
Queenstown to Sandy Hook add 4 hours 22 minutes for difference in time. ED.]

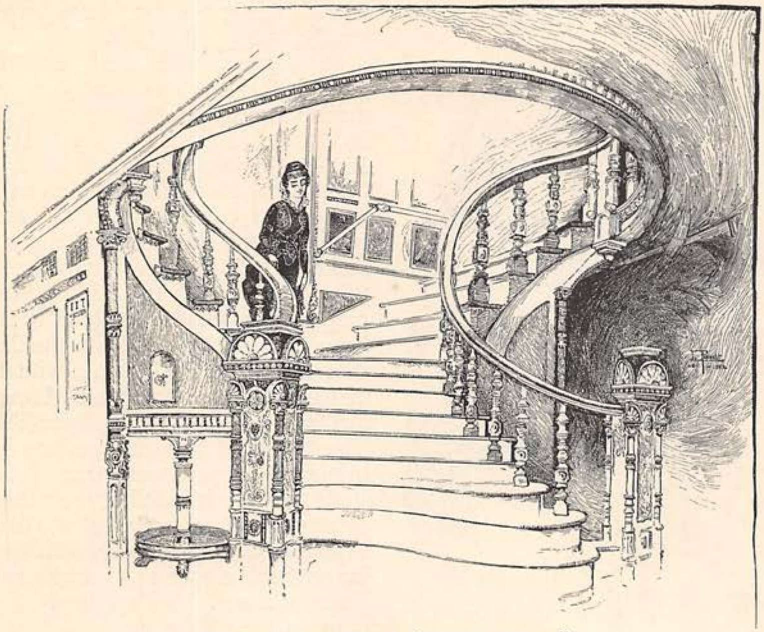
sharp edged bow. Nothing can be claimed for the straight stem on the score of beauty; but utility and economy are of prime importance in commercial naval architecture.

That the employment of masts and rigging is not greatly detrimental to the average speed of a fast steamer is shown by the fact that the fastest trips have been made by steamers carrying the heaviest spars. The steamer of the present day is provided with jury masts, rather than the heavy spars she would carry if she were a sailing ship. The disadvantage of carrying them against a head wind amounts to very little in a long voyage and is fully counterbalanced in the long run by the advantage gained when the wind is favorable. No ocean steam-ship should be permitted to go to sea without canvas; at least no passenger ship; it is a penny-wise economy which leads a company to dispense with it.



BOW OF THE "CITY OF ROME."

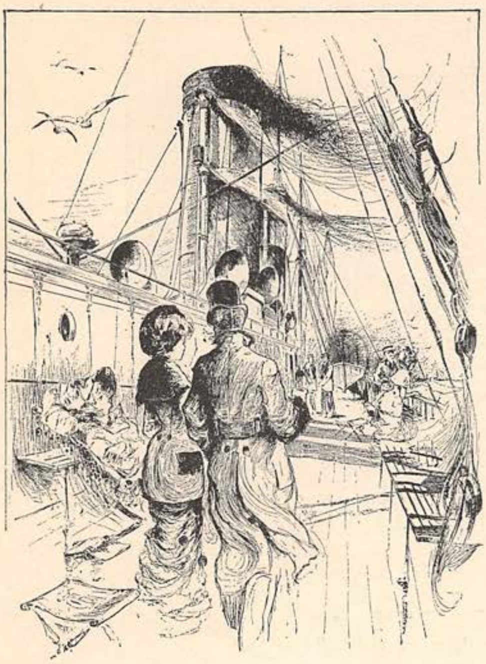
The ventilation of ocean steam-ships is a question of great importance, and one which is taxing the ingenuity of the sanitarian. On American coasting steamers this has received much attention. Their smaller size and greater proportionate beam make the general problem easier, and enables them also to carry a number of airy state-rooms in their deck houses. But when it comes to a ship having accommodations for 2000 people, the problem is not an easy one, for in such a vessel there are many dark nooks and narrow, winding passages, and in stormy weather many of the windows must be closed, partly as a matter of safety. Complaint is made sometimes on this score by passengers, who forget that, while some may like to sit in



STAIR-WAY MAIN SALOON "CITY OF PUEBLO."

a draft, there are others to whom it is excessively uncomfortable, not to say dangerous, to do so, and that a ship is not like a house on shore, but is subject to conditions involving constant regard to security. The best state-rooms in ocean steam-ships are now thoroughly ventilated. If passengers insist on being the last to secure good state-rooms in crowded ships or on paying second-class fare, they must not complain if they are served as they would be under similar circumstances at a hotel, in which it is manifestly impossible that all the rooms should be equally advantageous. The fact is, while the competition in passenger travel exists as it does now, steam-ship companies are obliged to offer every possible comfort to the traveler. Some passengers are so unreasonable that they are almost inclined to blame the ship itself because it does not keep on an even keel in a heavy sea. The question of ventilation has been most thoroughly studied in the steam-ships going to the tropics, in which every appliance is brought into action to withstand the heat. The sides of the state-rooms are made of open slats arranged as in a blind, and affording unobstructed circulation of air throughout the cabin. This, I well remember, proved a source of discomfort to me when going northward in one of the South African steamers. As we drew near Europe and met the colder air of the North Atlantic, the circulation of air over the berth was far from agreeable, and I was forced to hang blankets against the slat partition. In the new steam-ship *Austral*, has been introduced a novel plan for cabins throughout, intended to secure direct ventilation to each state-room, even in the heaviest weather. The state-rooms have a protected passage-way four feet wide running completely around them fore and aft. This passage is also carried across the vessel at frequent intervals. Each state-room is thus provided with large windows instead of the small, round bull's-eyes or dead-lights which must be closed in stormy weather. The outer port-holes, admitting the fresh air, always can be open, as the water can never penetrate to the state-room. This principle is undoubtedly destined to be widely adopted. The main saloon is cooled by a revolving fan moved by steam. This ship has been wisely provided with abundant canvas, and is in other respects well arranged for passenger and freight traffic.

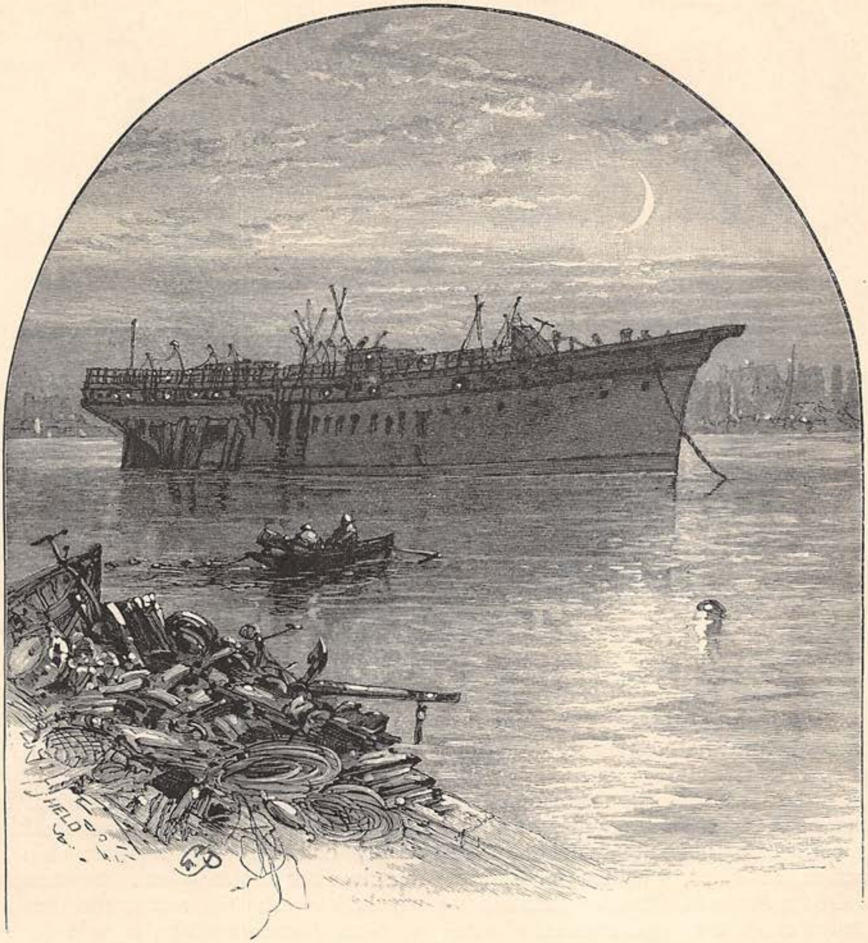
Another improvement, first introduced, we believe, on the *Germanic*, is the system of turning chairs at the dining tables. The passenger can by this means leave the table at his own convenience without incommoding others. The Alexandre line has introduced another improvement, in such ships as the *City of Pueblo*. The saloon is provided with small tables, as in a restaurant. The passenger is not obliged to eat with a crowd of strangers, but selects his own time for meals, paying only for what he orders. Many other conveniences are to be found on the passenger vessels of our time, such as bath-rooms, barber's shops, swinging couches, smoking-



ON DECK.

rooms, social halls, electric bells, and so forth. The application of steam to navigation is on the increase. The reduced expense of steam is leading to the employment of steamers in lines of trade which it has been supposed until recently must for a long period yet be carried on by sailing ships. The stanch conservative is gradually forced to yield to the steady march of steam. The famous Aberdeen clippers were devised partly for the trade in tea—a commodity so sensitive to marine atmosphere that for ages the best tea in Europe was brought overland from China. But the clipper, by her great speed, reduced the disadvantages of transportation on the sea, and the annual competition of the tea ships has been one of the stirring, almost romantic, incidents of modern navigation. The first ship to arrive with the advance cargo of the crop was crowned with fame in the shipping houses. So also was it with the first schooner that arrived in the Thames with the oranges of Fayal, and the bark which brought the first figs from Smyrna in season for Thanksgiving. The figs and the oranges are now largely brought by screw steamers, and at last the tea trade has been invaded by the steam-ship. The steamer *Stirling Castle* recently has been built expressly for this purpose, with large capacity for coal and a speed as yet unsurpassed by an ocean steamer. With a dead weight of 3000 tons on board she made eighteen and one-fifth knots an hour for six consecutive hours. She is built of steel, and registers 4300 tons. She made on her first passage the fastest run yet achieved between China and England, running in 29 days and 22 hours 11,250 miles, including stops for coal, or an average of 375 per day. This indicates a higher average of speed, for it includes three stoppages and the slow passage through the Suez Canal.

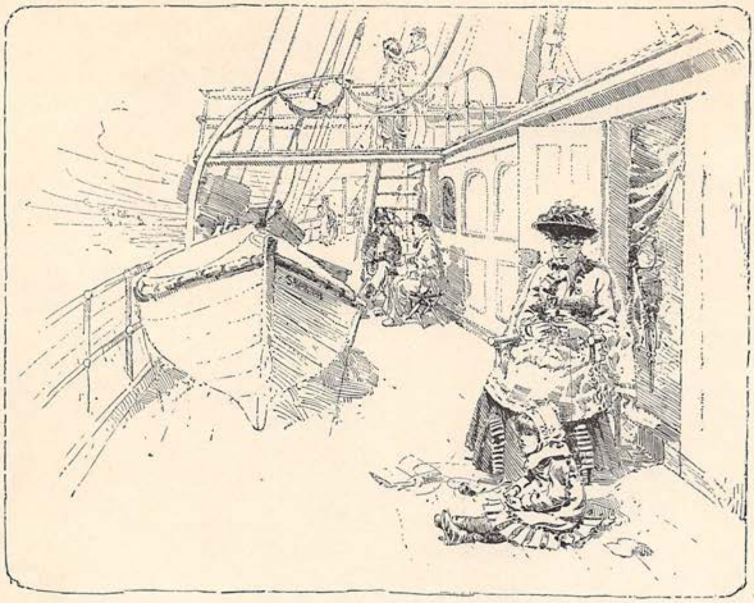
IN THE SALOON, "CITY OF PUEBLO."



IN THE LAST HARBOR.

In the fisheries the steamer is also fast gaining recognition. At first this change undoubtedly works hardship, as must always be the case when an innovation on established methods is introduced. The great seal fisheries of Newfoundland are now largely followed by screw steamers. Even the whale fisheries are yielding to the impulse in favor of steam. For many years whaling has been so unremunerative that only old ships could be employed in it, which were purchased at a low cost and refitted; often they have been old packet ships, strong, but antiquated. Already several American steam-whalers are employed in the business and a number are being constructed at San Francisco. The first cost is much larger than for a sailing vessel, but it is found that with an auxiliary screw more whales can be reached within a given time. Steam tenders are also coming into use to tow the whale-boats within easy distance of the whale and tow it back to the ship after it is captured.

Canvas, however, is too powerful an ally to be ignored, especially in long voyages when the winds are steady; and for freight traffic this combination of wind and steam is too admirable to be much longer neglected. A ship of this sort is now in process of construction at Bath, Me., of 1000 tons, for the Pacific trade. She is to be a full-rigged ship, with auxiliary screw. The immense coasting trade of the United States, which has been so efficiently carried on in stanch three-masted schooners, is also on the point of passing into this phase of navigation. Several three-masted schooners have been provided with small auxiliary screws, the engine being placed near the stern. The *Barnard Sumner* has the mizzen mast made as a tube of iron. When she is under steam this is used as a funnel, and, when under sail, the



FAIR WEATHER.

hoops of the spanker slide over it as in any ordinary schooner. The wide employment of sailing vessels with auxiliary steam power appears to be the most interesting feature of the near future of steam navigation.

As regards the continued use of metal we think there can be no question that it will for a long period be the chief material in the construction of ships, whether for sail or steam. Of its strength, durability, and adaptation to most of the requirements of commerce there is no ionger any doubt. The *Great Britain* was at last accounts still running between England and Australia, although she was launched in 1845 and lay on the beach in Dundrum Bay for a whole year. Good material, honest construction, and a thorough system of compartments, will make an iron steam-ship durable to an indefinite period. The weak point in the screw steam-ship is the shaft. As the breaking of the shaft occurs oftener in some lines than others, it would seem that this is a matter within human control. There should no longer be any excuse for the breaking of a shaft.

When the old steamer has fought her career with the surges, what becomes of her? Where does she go to hide her battered frame? Sometimes the iceberg or the stealthy and deadly collision with a sister ship in the fog gives her a death-blow. Sometimes she is wrecked on a hostile reef or founders in sight of port. Sometimes she is sold to another company, rebuilt, and, dubbed with a fresh name and register, tries in her new finery to pass for a new ship, until she disappears mysteriously with all on board. A few tears are shed in solitary homes for those who went down with her; but the verdict is, "no one to blame." Sometimes she is turned into a store-ship, a powder-boat, or a floating hospital, and, moored in a remote part of the harbor, sees the fleets of new ships go by in the distance.

S. G. W. Benjamin.