

their ship, we were marched off towards one of the hulks. We soon had evidence of the bad disposition of our captors towards us, for Toby Trundle, who was very indignant at being thus caught, beginning to saunter along as if he had no intention of hurrying himself to please them, one of them threatened to give him a prog with his bayonet. As we were walking along as slowly as Trundle could contrive to go, the sound of a shot reached our ears. It came from the sea. Our guards started and talked rapidly to each other. Several other shots followed in succession, some close together.

"There are two at it, of that I am sure," exclaimed O'Carroll.

The Frenchmen continued their gesticulations with increased animation. They were evidently eager to get to the mouth of the harbour, whence they could look seaward.

"They think that there is something in the wind, depend on that," observed Trundle.

Presently the firing became more and more rapid, seeming to our ears to come nearer and nearer. The Frenchmen could no longer restrain their eagerness to learn the cause of the firing, and totally disregarding, probably indeed forgetting us, off they set running towards the shore as fast as their legs could carry them. We waited for a few minutes to let them have a fair start, and then followed in their wake for some distance, turning off, however, after a time, to the right, so that, should they come back to look for us, we might not so easily be found. We in a short time reached a high rocky mound, whence we got a view of the sea spread out before us. Within a mile and a half of the land were two ships, both with topgallant sails set, standing in close-hauled towards the harbour. The wind was somewhat off the land, but yet if it continued steady, it was possible that they might fetch the harbour-mouth. Such, it appeared evident, was the object of the one, while to prevent her so doing was the aim of the other, which was the largest and nearest to us. As soon as the two midshipmen set eyes on the latter, they clapped their hands like children with delight, exclaiming at the top of their voices, "The Phœbe! the Phœbe! hurra! hurra!" O'Carroll took a more steady glance at the other ship, and then shouted, with no less delight, "And that's the Mignonne, and La Roche's day has come at last."

"I should hope so, indeed," cried Trundle; "depend on it, the Phœbe won't have done with him till he has made him eat a big dish of humble pie."

The frigate kept firing rapidly her foremost guns at the Frenchman, who replied to them in a spirited manner, with his aftermost ones, as they could be brought to bear. He was all the time luffing up, trying to eat into the wind as it were, but as that was scant, it gave the Phœbe, which was well to windward, a great advantage, and she was now rapidly coming up with him. As she did so, she every now and then luffed up for an instant, and let fly her whole broadside, doing considerable execution. We eagerly watched the effect of the shot. The Frenchman's sails were soon riddled, and several of his spars seemed to be wounded, many of his ropes, too, hanging in festoons. At last, directly after another broadside, down came his spanker gaff, shot away in the jaws, while the mizen topsail braces shared the same fate. In vain the crew ran aloft to repair the damage; the ship rapidly fell off, and all prospect of her fetching up to the harbour was lost, unless by a miracle the wind should suddenly shift round. The instant the sail came down, the midshipmen gave vent to their feelings of exultation in a loud "Hip, hip, hurra!" in which we could not help joining

them and the crew of the Phœbe, whom we could fancy at the moment doing the same thing.

"Don't be too sure that the Mignonne is taken, however," cried O'Carroll. "I never saw a faster craft, and see she is keeping away and going to try what her heels can do for her, dead before the wind."

The Mignonne, however, could not keep away without being raked by the Phœbe, whose shot, now delivered low, must have told with fearful effect along her decks. This done, the Phœbe instantly bore up in chase, and not having lost a spar, though her sails had several shot-holes through them, rapidly gained on her. The Frenchmen, to give themselves every chance of escape, were now busily employed in getting out studden-sail booms, in spite of the shot which went whizzing after them. In a marvellously short space of time a wide spread of canvas was exhibited on either side, showing that, though many of her men had fallen, she had a numerous and well-trained crew.

"They are smart fellows, indeed," I remarked. "Many of them fight with halts round their necks."

"That makes fellows smart in more senses than one," answered O'Carroll.

The Phœbe, of course, had to set her studden-sails, and away the two ships glided before the freshening breeze. We watched them with breathless interest. Their speed at first seemed so equal that the chase had still, it seemed, a chance of escaping.

Trust to our captain, he'll stick to her till he has made her strike, or he will chase her round the world," said the two midshipmen, in the same breath.

The Mignonne was firing away all the time with her stern chasers, while the frigate was replying in from those at her bows. They were both firing at each other's spars, the one hoping, by crippling her opponent, to escape, the other to prevent her doing so. What had become of our guards all this time we had not for a moment thought, while we hoped that they had equally forgotten us. The chase, indeed, probably absorbed their attention as it did ours. Few of us doubted that the English frigate would ultimately capture the Frenchman; but should she do so would she of necessity come back with her prize to our island, or would she sail away and, perhaps ignorant of our existence, leave us to our fate. One thing was evident, that we ought to guard ourselves against the insolence of the French garrison. The men were evidently the scum of society, and should they find themselves without restraint, it was impossible to say what atrocities they might not commit. Anxious as we were to know the result of the chase, we agreed, therefore, to go back to our friends to give them warning, and to consult with them what steps to adopt. Before leaving our look-out place we took one more anxious glance at the two ships. Both O'Carroll and the midshipmen declared that the Phœbe was positively overhauling the Mignonne, and that in a short time we should see the latter haul down her flag. I doubted it.

THE P. AND O. COMPANY.

THIRTY years have elapsed since the "Hindustan" was despatched by the company to open the line of communication between this country and the East. Previous to that, the traffic did not extend beyond the peninsula of Spain; and hence, on the extension of the line, the directors named the company "Peninsular and Oriental." It must not be supposed that this pioneer of the magni-

ficient line of steamers that now sail up the Mediterranean was at all to be compared with even the smallest of them in tonnage or horse-power. Steam navigation was at that period still in its infancy, and, twenty-five years previously, the whole United Kingdom possessed but one solitary steamboat, and that only of sixty-nine tons burden. Of the increase of this mighty power during the subsequent twenty-five years, the progress of the Peninsular and Oriental Company exhibits the most remarkable example on record. At the close of that period we find them in possession of fifty-three steamships, of an aggregate of 86,411 tons, fitted with steam machinery of 19,690 horse-power; nine steam-tugs of 864 tons and 275 horse-power; and 13,663 tons of sailing transports, store, and coal-ships, the value of which, with the other property of the company, amounted to £3,836,084; while the receipts for work performed by this fleet of steamers amounted to £2,136,076 during the year.

Here is a vast navy in itself: in fact, the P. and O. Company may rank as a great naval power. In ordinary times it is a power employed in the honourable and peaceful tasks of traffic and commerce, but also available for transport service in time of war.* They are ever adding to their fleet the finest ships which money and art can secure. The last we hear of is the *Magdala*, of 3,000 tons, with a sister ship, the *Hindustan*, and another of smaller tonnage. Losses occur sometimes, as that of the *Nippon* lately at Amoy, but the list is at once filled up, if possible, with finer ships. The tear and wear alone of such a fleet is written down at £150,000, and the company is its own underwriter.

If the company at the outset had depended upon their own resources and the ordinary patronage of the public, it is doubtful whether they would have made such rapid progress; but, in aid of their line, the Government granted them a subsidy to carry the mails for India, by way of the Isthmus of Suez and the Red Sea, when they had previously been conveyed by the tedious passage round the Cape of Good Hope, in sailing-ships. Of course the new route required a separate service of steam-vessels from Suez, where the company have a *dépôt* for provisioning and refitting that is unequalled anywhere, besides a large establishment at Aden, at the entrance of the Red Sea. At first the line was confined to Bombay, Ceylon, Madras, and Calcutta, after which it was extended to Singapore, Hong Kong, and other China ports, and from Point de Galle, in Ceylon, to Australia. Recently the route has been extended from Shanghai to Yokohama, in Japan, and a branch service leaves Suez for Seychelles and the Mauritius.

Including the Japan and local China service, each delivery in London of the mails by the company's steamers involves the employment of eight steamships, and a voyage of 19,867 miles by sea, besides a journey of 982 miles by land, making 20,849 miles for each trip. In the performance of one of these complete trips, mails, passengers, and cargo, are delivered and received at eighteen ports, and are transferred from ship to ship five times. A fine-weather voyage throughout is rarely if ever experienced. If the India and China seas are calm during the European winter, the vessels may be subjected to the most violent weather in the Bay of Biscay and the Mediterranean. If the Bay of Biscay

and Mediterranean are calm in the European summer, monsoons prevail in the Indian Ocean, and the dreaded typhoon sweeps the China and Japan seas; while at the same time it is winter in Australia, when the stormiest weather occurs during the year in the southern hemisphere.

The Peninsular and Oriental vessels never meet with icebergs, like those which traverse colder seas; but the circumstance which insures their freedom from this form of annoyance exposes them to another difficulty, which will be appreciated by those who understand something of the working of a steam-engine. Much of a steam-engine's efficiency depends upon the principle of condensation—condensation, of course, depends upon a constant supply of cold water. Now, the company's steamers in the East, during a great part of the year, navigate an ocean of warm water; the temperature of the sea being frequently over 90°, the working power of the machinery is consequently much impaired and decreased.

The punctuality with which these services are performed is most remarkable. The mail contract imposes a heavy penalty for not leaving a steamer ready to start to the day from the terminal and principal ports; but during the first twenty-five years of the company's contract, they never once incurred the penalty, although, since the commencement of the existing India and China contracts, their steamers have started, on those lines alone, upwards of four thousand times. The Postmaster-General, in one of his recent reports, mentioned the arrival of the combined mails from Sydney, New South Wales, a distance of 13,000 miles; from Calcutta, 8000; from Shanghai, 11,000; and from Hong Kong, upwards of 10,000 miles; these mails being due in London on 13th November, at midnight, they arrived *one hour and ten minutes before their time*. This is no unusual occurrence, for in the great majority of arrivals, eight and nine times out of twelve, the mails either arrive the day before, or the day on which they are due. When the telegram announces "The India, China, and Japan Mails" at Marseilles, the public must do justice to the extraordinary feat thus safely accomplished.* To bring all those mail-bags and boxes together, a score of seas have been traversed, from the Yellow Sea and North Pacific, through the Malacca Straits, down the Bay of Bengal, across the Southern Ocean, the Sunda Sea, the waters of Sindbad, up through Bab-el-Mandeb and the Red and Mediterranean seas, the company's keels have ploughed the billows to bring us the letters of business and friendship, of love and hate, of pleasure and sorrow, of satisfaction, disappointment, and perpetual progress.

During the first twenty-five years the company carried upwards of half a million of passengers; and not more than five or six lives have been lost by wreck or other casualty. Compared with other passenger lines to America and Australia, where the ships are thronged by the poorer class of emigrants at low passage rates, this number of passengers is not remarkable. But when we take into consideration the fact that the company convey none but first-class passengers at high rates, with steerage accommodation only for their servants, the number becomes important by reason of their position in society, and the large sum paid into the revenue of

* During the Abyssinian war the Peninsular and Oriental lent the Government six fine vessels for the Red Sea and Indian Ocean transport duties; it supplied in all about 150,000 tons of coal; and by the condenser in its ships it furnished the army with 500,000 gallons of distilled water.

* For one London Oriental mail delivery seven first-class ships of the P. and O. have to work in harmony. One has to come from Japan, a second from Hong Kong, a third from Sydney, a fourth from Calcutta and Madras—all timed nicely to meet at Point de Galle in Ceylon. Then the vessel from Point de Galle and that from Bombay join mails at Suez, and a seventh brings them from Alexandria to Marseilles.

the company. In former years the tariff of charges was £152 10s. to Calcutta, £180 to Shanghai, and £150 to Melbourne or Sydney; so that the annual average passage-money was not less than one and a quarter millions sterling, including passengers' fares for short distances along the line. When the French company started their opposition, about the year 1862, they reduced the rates of passage-money, to which the Peninsular and Oriental Company had to conform, charging £99 10s. to Calcutta, with proportionate reduction to other ports. From this date the monopoly of passenger traffic to the East was broken in upon, and the *Messageries Impériales* service carries now nearly as many passengers as the Peninsular and Oriental Company.

But the French company made another serious innovation on the stereotyped passenger system of their English rivals, in preparing separate and tolerably good accommodation for second and third-class passengers. This was a great boon to those who had not the means to travel first-class; who had either to mess with servants, or proceed by sailing-vessel round the Cape of Good Hope—where the voyage is as five months to two 'Overland.' The Peninsular and Oriental Company have not yet conformed to this arrangement of the rival line; but it would be a wise step on the part of the directors, while they are building a larger class of vessels to carry merchandise, if they fitted up second-class and third-class cabins in them. Passengers to the East are not now restricted to the Government officials and merchant princes, who can afford to pay high rates. There is an increasing migration of the comparatively poorer classes to India, China, and Japan, who have either gone to "push their fortune," or who have obtained situations, and to whom time is money. Consequently, while the fitting up of cheaper accommodation for passengers would meet the requirements of the increasing traffic, there would be room for both services all the year round. These remarks apply more particularly to the passenger traffic east of Suez, for the vessels from Southampton to Alexandria have tolerably good accommodation for second-class passengers.

On the other hand, it is said that the fare on board the French ships is not suited to an Englishman's palate; and therefore the voyage becomes uncomfortable, when John Bull does not get his roast beef and brown stout, which is amply served up on board the Peninsular and Oriental boats. We have travelled by both lines, and can testify to the abundance of fare in the vessels of each; and to our taste the meals on board the French boats were preferable, especially as it is principally during hot weather of a tropical character that the dishes are served up. At such a time few people can relish great joints of meat being laid on the table, and to some delicate stomachs the sight is more likely to take all appetite away. Some nice tasty dish is preferable, cooked in the French style, while a drink of claret and iced water is more refreshing than even "pale India ale." Indeed, we have often thought that the Peninsular and Oriental Company would do well not to bring the hot joints on the table at all, as they only serve to increase the temperature of the dining-saloon, when it is necessary to keep it cool by "punkas." *Apropos* of this: none of these steamers, French or English, have a proper system of ventilation to cool the interior. Surely there is ingenuity enough among the captains and engineers to fit up some kind of fan to agitate the suffocating air, and set it going by the steam machinery. At present all the apparatus for this purpose is the old Indian punka, slung upon swivels, and pulled to and fro by manual labour. So intense

is the heat in sailing before the wind in the Red Sea, that the captains have now and then to veer the ship round to meet the breeze and ventilate the cabins.

It may be supposed that the consumption of provisions, and especially drinkables, is considerable on board these ships. In 1862 the consumption amounted to 14,602,514lbs. of what are termed general stores; 1,301,608 bottles of wine and spirits; 524,250 bottles of pale ale; 177,310 head of live stock; 160,130 poultry, and 13,015 sheep. The item of *ice* is of importance, and put down at 3,046,000lbs. Besides having imported ice on board the Mediterranean boats, the company have an ice-making machine at Suez, that supplies all the ships east of that port. They have also a large machine for distilling water there; but this is not required so much now, since the French cut the fresh-water canal from the Nile to that port, which supplies both the town and shipping. Altogether, the *depôt* of the company at Suez is upon a colossal scale. Besides the immense store of provisions and drinkables—larger than any single store in the docks of London or Liverpool—they have every description of marine stores, "from a needle to an anchor," piled up in the premises, for refitting the vessels. Then out of doors, in that rainless district, all the coals are piled up on the beach, for the supply of the steamers east of Suez. The company pay an average of more than half-a-million sterling every year for coals, and an average of 170 sailing-ships is engaged annually in conveying coals to their stations. The coals suffer greatly in transmission; and, notwithstanding all the expense incurred for their protection from the effects of climate, they undergo a depreciation of fully 20 per cent. from their original quality before they are burnt. In addition to that deterioration, the coals sometimes catch fire if laid down wet in the face of the hot sun; and a whole cargo will thus be consumed before the fire can be extinguished.

It will be seen from the foregoing, that if the company have a large revenue they have also a corresponding expenditure; and during the past five years since the statistics here given, the former has been diminishing, while the latter has been increasing. Without entering into details, the reader will glean from the following extract from the report read at the half-yearly meeting in June, 1867, the chief causes of the cessation of profits:—"The export of specie to the East, which has usually formed a considerable portion of the company's revenue, has, during the six months embraced in this report, almost entirely ceased. There has also been a great falling off in the revenue, owing to the contraction of mercantile operations in the East, which has followed the monetary panic of 1866, and the very active competition of the French company. To these disadvantages has been added a considerable rise in the cost of coal at the foreign *depôts*, involving an increased outlay, as compared with the corresponding six months of last year, of upwards of £40,000. It is scarcely necessary to state that the directors could exercise no control over these adverse circumstances, neither could they, by any modification or curtailment of the services, counteract the unfortunate results, as the strict conditions of the mail contract had to be fulfilled. Without, therefore, entering into detailed statements and figures, the directors regret to report that the state of the accounts to 31st March, exhibits an excess of expenditure over receipts to the extent of £36,000, without making any provision for insurance or depreciation."

These candid statements are creditable to the directors of the company, as they honestly show the state of their affairs; while, in other portions of the report, proof is

given of their solvent condition, and the prospects of increased revenue next year. That their anticipations will be realised is our hearty wish, as the collapse of such a company would be in itself a national calamity. Other associations, with monetary transactions of equal magnitude, might fail without bringing about one tithe of the effects that would accrue from such a disaster here. Including the splendid establishments in London and Southampton, no less than fourteen principal and subsidiary establishments have to be kept up, and there are employed altogether 8,250 persons afloat, and 4,351 on shore, making a total of 12,601. But this does not give the actual number of individuals dependent upon the expenditure of the company, which at a low estimate cannot be less than 40,000, and may be 50,000. And if we take into consideration those that are indirectly benefited by their monetary operations, we may double or treble these numbers. Viewing it in this light, the company is a great floating colony, administering affairs equal to some small continental state or dependency of the British Crown. But that which makes it of most importance to England, is being a practical school for seamanship, and the training of our youth in the art of navigation. The officers on board the Peninsular and Oriental Company's steam ships are gentlemen who will compare favourably with the officers of her Majesty's Navy in the details of their profession, especially as pilots for the difficult navigation of the eastern seas, which, as we have seen, they have done with an infinitesimal loss of life, and comparatively trifling loss of property. Under these circumstances it is to be hoped that the directors will continue manfully to face their difficulties, and restore the Peninsular and Oriental Steam Navigation Company to its former prosperity, and their vessels command that amount of public favour which will render their line preferable to that of any foreign company, in economical charges and good accommodation. We are glad to see that they have concluded a new contract with the Government for a longer period than before, and on more favourable terms. The contract is to be for twelve years. There is to be a yearly payment of £400,000, unless the fund accruing for dividend from all sources should, *from causes not within the company's control*, fall below the amount required to pay six per cent. on their capital, in which case the subsidy is to be increased by the amount of the deficiency. On the other hand, should the profits permit the declaration of a dividend of more than eight per cent., the company undertake to pay to the Post-office one-fourth of the excess. The tender provides for a weekly service between Southampton and Alexandria, between Marseilles and Alexandria, and between Bombay and Suez; and for a service every alternate week between Suez and Hong Kong, Hong Kong and Shanghai, Shanghai and Yokohama, Bombay and Galle, and Galle and Calcutta. The rate of speed is to be ten knots an hour on the lines to and from Alexandria, and nine and a-half knots on the lines eastward of Suez. The stipulation guaranteeing a certain dividend, although an important novelty in the case of the Peninsular and Oriental Company, is not without precedent, the contract with the Kingston and Holyhead line including a similar provision. In arranging this contract her Majesty's Government have, we are glad to see, taken a broad view of a matter which is not departmental, but national in importance. The public have no wish that the company should be a loser by the services rendered, and are quite satisfied that, so far as our intercourse with the East is concerned, our communications could not be in better hands.

SIR CHARLES WHEATSTONE.

THIRTY years have elapsed since the subject of this memoir established the first practical result of his many investigations connected with electro-telegraphy, by laying, on the London and Blackwall Railway, the first electro-magnetic telegraph. The wires employed were of copper, enclosed in an iron tube, each wire being separated from its neighbour by some non-conducting material. A submarine electric telegraph had also been, from the commencement of Mr. Wheatstone's experiments, a prominent object in his thoughts. The laying of the Atlantic Cable, in August, 1866, was signalised by honours awarded to those who took an executive share in that great event; while Wheatstone, "but for whose marvellous following in the track of his gifted predecessors, there could as yet have been no electric telegraph at all, was left out in the cold, without being named!" Mr. Wheatstone has since received the honour of knighthood, as commonly thought, in recognition of his share in this great work of national importance—the electric telegraph. This, however, is but a portion of the labours of a series of years devoted to scientific researches, which had been rewarded by medals and other distinctions from the leading academies of the Continent, ere they were fully recognised in the country which gave our philosopher birth.

Charles Wheatstone was born in 1802, in Gloucester, a city noted as the birthplace of divines and scholars. In early life he was engaged in the manufacture of musical instruments, which led him to study the laws of Sound. In 1833, he presented to the Royal Society a paper "On Acoustic Figures;" and in 1835 he read to the Royal Institution an account of the different attempts which had been made to invent a speaking machine; and exhibited a copy of a machine from Germany, which distinctly pronounced *mamma, papa, mother, father*, and other words.

Light and Electricity were the sciences which Wheatstone was next led to investigate; and in 1834 he communicated to the Royal Society his experiments to measure the velocity of electric currents, and the duration of the electric spark. In the former it appeared that the human eye is capable of perceiving phenomena of light whose duration is limited to the millionth part of a second; and by Wheatstone's apparatus the spark was ascertained not to exceed the twenty-five thousandth part of second: a cannon-ball, if illumined in its flight by a flash of lightning, would, in consequence of the momentary duration of the light, appear to be stationary; and even the wings of an insect, that move ten thousand times in a second, would seem at rest. In the year when these interesting results were obtained, Wheatstone received the appointment of Professor of Experimental Philosophy in King's College, London.

In 1838, Professor Wheatstone submitted to the British Association at Newcastle his Stereoscope, an instrument contrived by him for illustrating the phenomena of binocular vision, the principle of which is thus simplified. When we look at any round object, first with one eye, and then with the other, we discover that with the right eye we see most of the right-hand side of the object, and with the left eye most of the left-hand side. When these two images are combined, we see an object which we know to be round. This is effected by the Stereoscope, which consists of two mirrors placed each at an angle of 45 degrees, or of two semi-lenses turned with their curved sides towards each other. To view its phenomena two pictures are