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Friday, March 5, 1880.

THE MOST HONBLE. THE MARQUIS OF LANSDOWNE, &c., &c.,
in the Chair.

MARITIME WARFARE: THE ADAPTATION OF OCEAN
STEAMERS TO WAR PURPOSES.

By DONALD CURRIE, Esq., C.M.G.

In March, 1877, I had the honour of reading a paper to the members of this Institution upon the importance to the British Empire of a complete system of telegraphs, coaling stations, and graving docks; and your Council has now asked me to deal with questions connected with the adaptation of ocean steamers to war purposes. At first I felt compelled to decline this invitation, partly because of very heavy and pressing engagements claiming the whole of my time, and partly on the ground of the difficulty I might find in treating of matters which would appear to have a personal interest. It appeared to me also that the subject to be opened up was of the utmost national importance and of wide range, and that a more minute study than I could possibly give was required in the elucidation of the points to be brought under review. I have, however, undertaken to put down some observations fitted to draw forth a discussion amongst the eminent men practically acquainted with the subject who now favour me with a hearing; and I can only ask you to bear with me if my remarks are not sufficiently explicit on technical points, or if I may appear to be too general in my statements. It is not easy for a shipowner to discuss arguments bearing upon matters of national importance in which he may be himself concerned, or to elaborate a system in the carrying out of which his own vessels may be required to take a part.

The object of your Council is a national one, intended to advance measures fitted to secure our maritime supremacy, and I count, as I have said, upon your just and calm judgment in the discussion of the subject. We are all interested in this matter, either as naval and military men, or as shipowners, or as individuals taking part in public affairs; and I take the question in hand with no regard whatever to party politics or party feeling, but simply with a view to its bearings upon our Imperial and Colonial interests.

In the three short years which have passed since I wrote the paper already referred to, the world has had an eventful history. Perhaps within no similar period has so much of European and Eastern interest been compressed as in those three years, and the forces brought into play have yet to show their full development. The Eastern question, the African question, the Central Asian question, the Indian Frontier question, have all come to the front for settlement; they are not yet settled, and the final arrangement of these, as well as of the relations of the European Powers to each other, must necessarily be delayed for a certain time, aggravated as the situation is by the large increase in the military and naval forces of Continental Powers. I do not claim prophetic skill; but in that paper I urged that we ought to be prepared, when the occasion should arise, not merely for defence, but for energetic attack; and I pointed out that England, depending upon her naval supremacy, would risk much, unless ready with suitable appliances and possessed of facilities for the combination, supply, equipment, and repair of our fleets. Moreover, I demonstrated that, in the event of war, most likely to occur as far as England was concerned in India, China, or the East, rather than on the Continent of Europe, it would be absolutely necessary to bear in mind the precarious hold we had of our communications with the East and with Australia through the Suez Canal, and that we should look to the alternative route by way of the Cape of Good Hope. I showed the importance to England of our position at the Cape; and that in the Colonies of South Africa there was every indication that we might be involved in a Kaffir war. We have had a Kaffir war in the Cape Colony; we have had a Zulu war on the Natal borders, which has seriously taxed the energies of the Government: we have been almost at war with Russia; and although a peace has been concluded in South Africa, and the danger of war with Russia is happily averted, South African and Eastern questions are not yet settled. We cannot be free from apprehensions as to the result of the difficulties still to be overcome in Afghanistan and in the East.

If we look to the position of the Continental Powers, is there any assurance to be derived from their mutual relations? Upheavals in Europe; convulsions in Central Asia; complications all round; this is the view to be taken of the position of matters political at the present moment; and in discussing the question of the value of the mercantile marine of this country as an auxiliary to the Royal Navy we have not only to take into account the force in action which may produce war, but we must consider with whom we may have to deal.

Over ten millions of armed men now constitute the military forces of Russia, Germany, France, Austria, and Italy; and, although our insular position may be supposed to protect us from all these or from any single foreign Power, yet we have to ask ourselves these questions—May our Colonies be attacked? May our food supplies be cut off? May the enemy land upon our shores? It is necessary to take into account a possible war with more than one naval Power; although we are now at peace, we may, sooner or later, be at war. Italy itself has steadily increased its power of action upon the sea; France has in-

creased her navy; Germany and Russia are making larger strides in the direction of more powerful naval forces.

At the present moment the Russians have in contemplation an increase to their fleet of cruisers, and have under consideration a greater speed for them than has yet been attained by any of the ships which they have purchased. What does this point to but the destruction of our commerce in a possible war? The sooner, therefore, our commerce becomes alive to the necessity of assisting the Government, and the Government becomes convinced of the propriety of preconceived arrangement, the better for England's position. The Russians have by their movements in the North Pacific drawn the attention of this country to the forces which they have in that quarter. In January of this year you will remember that two Russian corvettes, the "Ras-boynik" (Brigand), carrying the Commodore's pennant, and the "Nayesdnick" (Jockey) were at Portsmouth, and sailed for China, after being fitted with the new fish torpedoes received from Fiume, such as are now under trial in the "Hecla." These vessels averaged on trial 13 to 15 knots an hour. The Russians also are said to have the intention of employing their cruiser fleet in time of peace in a regular steam service between Odessa and Vladivostock in the North Pacific.

Public attention has lately been called to a lecture delivered at St. Petersburg on the subject of these cruisers, and some interest is attached to the evident friendliness shown by some public men in America in furtherance of Russian plans. In the United States more weight is allowed to the injury the Russian volunteer fleet could inflict upon our commerce than is here attached to it, partly, I dare say, because of their experience of the ravages of the "Alabama;" but in our case the naval authorities would exercise a much stricter vigilance and more vigorous course of proceeding towards these cruisers, than was adopted by the Federal Government. If proper measures had been adopted, they might easily enough have captured the "Alabama," or at any rate have limited her proceedings. One thing is certain, that the Russian programme, in view of war breaking out between their country and ours, is this: to despatch their "Alabamas" to the Eastern and Western Coast of America, and to the China seas, directing their operations with facility by the system of telegraphs united upon Russian territory, not merely from Europe or America, but from the Russian possessions in the north-west of the Pacific.

It is interesting to look at the means which were employed in Russia to raise what they call a volunteer fleet. In Moscow the Governor-General, Prince Dolgorouki, personally addressed himself to the wealthy merchants of that city; he appealed to their fine sensibilities of patriotism, and pointed out that the Emperor would be pleased to have their names laid before him. By that means he obtained sums which, in their calmer moments, the subscribers felt surprised they had ever ventured to promise in the sacred cause of their country. To make up the total sum which such a city as Moscow, ancient capital of All the Russias, should give, the energetic Governor-General had recourse to a gentle pressure of taxation, and received from the merchants the required balance by adding to the guild dues.

This is an illustration of how the volunteer cruisers' fund was raised by the liberal and patriotic exertions of a free people. It is not, however, very important how the Russian volunteer fleet was got up. I dare say one object was to frighten shipowners and commercial men in Great Britain, and thereby to bring pressure on the British Government in relation to questions of foreign policy then being warmly discussed in this country. Whatever the special motive, we are face to face with the necessity of providing against a threatened danger; and if I can show that we may provide with ease against it, we shall have reached *one* practical point in the argument, namely, whether there can be any adaptation of ocean steamers to war purposes.

And now to enter upon the more special subject of my paper. Speaking generally, merchant steamers, if of suitable speed, will be most useful; (1.) if employed as mail packets in time of war; (2.) as offensive cruisers; (3.) as cruisers on the defensive; (4.) as despatch vessels attached to a squadron or naval station; (5.) as transports; and (6.) as gunboats, or store ships.

First, as mail steamers; in time of war their value will not be second to their usefulness during peace. The telegraph provides instantaneous communication, but the fuller details which correspondence supplies are necessary in the time of conflict, both for Government and commercial purposes. The telegraph, indeed, will be always liable to the risk of destruction; the very first thing the enemy will do, if at war with England, will be to cut our means of telegraphic intercourse, and if we look to the Suez Canal and the Red Sea as the way by which we communicate with China, our Pacific Stations, the Eastern Seas, India, Australia, and Eastern and Southern Africa, we must expect that at any moment, while hostilities are in progress, there will be ever-recurring opportunities for the enemy to inflict upon us the injury which will result from the destruction of the telegraph. Nothing can be more prejudicial to naval and military operations, dependent perhaps upon instantaneous orders from home, or messages from abroad to the authorities in this country, than a sudden and unexpected stoppage of the means of communication. We have now, for example, the cable to South Africa, established as the result of a military disaster, and not as the outcome of deliberate judgment and foresight on the part of the Government or nation, and within the last few days it has twice been broken near the coast of Mozambique, just when the Government were in communication with the Colonial authorities upon matters of the utmost importance to the welfare of South Africa. If, then, the cables can be cut or may be broken by accident, am I wrong in anticipating that during war more than in times of peace the mail steamer is a positive necessity? If a necessity, she should be armed and able to defend herself, and she should be ready to do more, if required, than resist attack.

The wants, however, of commerce have to be supplied; passengers must be conveyed; and the Government service itself has to be met in the conveyance of Officers and men to fill up vacancies; special and important shipments of warlike and other stores and goods have to be forwarded; and the swift mail steamer presents the required means.

These mail steamers, if to be maintained, must be vessels fit to contend with the enemy's cruisers, who will seek to destroy the postal communications with our colonial dependencies; and whether this country decides or does not decide upon the employment of merchant steamers as cruisers (for there is no political objection or international law to prevent it), there is the necessity laid upon the Government to select the best vessels of the mercantile marine for equipment as mail packets, to be fitted in such a way as to be prepared to meet the ships of the enemy.

2nd and 3rd. I take these points together. As cruisers to act offensively and defensively, whether to destroy the enemy's commerce or to assist in the protection of our own, a swift, properly constructed, and well adapted merchant steamer may be most usefully and effectively employed. To be of value, these vessels must have certain qualifications. I will name some of them. Speed is of the first necessity; strength of construction is indispensable; bulkheads must be arranged so as to secure flotation if one or perhaps even two compartments were pierced; in case of fire, the 'tween decks should have separate fireproof divisions; the guns must be placed either on the upper or second deck, sufficiently high above the water to be of service in a sea-way, or sufficiently protected upon the upper deck, and that upper deck will require to be strongly supported against the risk of pressure or recoil. The vital parts of the steamers can be efficiently protected by coal bunkers, with loose thin iron sheets interspersed, as shown by the experiments on the "Oberon," at Portsmouth. The pumping arrangements requisite are very different from those which are generally to be found in merchant ships. The pumping engine should be sufficiently above the water in the event of the fires in the boilers of the ship being put out by a heavy leak. I may venture to say that very few steamers have, in addition to Downton's pumps, adequate steam pumps separate from the circulating pumps of the engine, and which possess the security of having the donkey boilers placed on the main or upper deck.

A great deal more than this is required. The rig of the vessel is to be looked to; the coal burning has to be estimated and taken minutely into consideration. We may look at two steamers of equal tonnage in the same dock; they may be of nearly the same dimensions, and owned by equally respectable owners: they may both be on the Admiralty List; they may each rejoice in the character of being a mail packet; and yet the one vessel will burn, at a 12 knots' speed, 50 tons per day, and the other only 35 tons; both may be the highest class at Lloyd's, but one has only a thin wooden upper deck, quite unfit to carry powerful ordnance, the other has a solid iron deck throughout, adequate to carry ten heavy guns. To outsiders these steamers possess equal advantages, and yet the one vessel could destroy the other in single combat in half an hour, or could protract the struggle until her adversary was rendered helpless by the exhaustion of her coal. In the one case the steamer could carry ten 64-pounders, or even a more powerful gun, with greater penetrating power, such as the Italians have adopted, on the upper deck, with a freeboard of

about 11 feet on a draught of 21 to 22 feet of water; while the other could carry only one or two light guns at all on the upper deck, and would only have 7 to 8 feet of freeboard if her guns were placed upon the main deck. You might put eight guns there, but she could not work them in bad weather.

4. As despatch vessels, swift merchant steamers, such as the China steam clippers of the day, would be extremely valuable in conveying intelligence for the naval or military authorities between home and foreign ports and our naval stations, or for carrying important communications between the Home Authorities and our Officers abroad, or in attendance on a squadron as look-out vessels when off an enemy's port. If two such vessels were attached to a squadron, the Admiral in command could have one on each beam at such a distance as to increase the value of his range of observation. A third steamer a few miles in advance would serve a useful purpose as a naval scout. A double service to the Admiral might thus be secured, namely, if the squadron were cruising at 9 knots, the look-out ships could maintain their position of observation; and if the vessels of the squadron had their fires banked and were under easy steam, the early intelligence which the scouting steamers might convey would give the Admiral time to get up full steam. It would not be necessary to draw in these look-out ships on a clear night to a nearer distance than 8 miles, as it has been practically proved that signal communication by the electric light can be easily carried on at that distance. In no country are there so many merchant ships of this class as in England.

5. You know the value of the merchant ship as a transport, and the late war has shown the effective service which they can render in that capacity. I have seen in two or three wars in which we have been engaged that efficiency, or fitness for the purpose, has not always been sufficiently considered. The relative coal consumption, or the speed, or carrying capacity, or water ballast, or general arrangements, do not enter into the estimate of efficiency; a shilling or two a ton per month has been often thought of primary importance. In one department, the safety provided by bulkheads is said to be all-important for the transport of troops; in another department, economy has to be the order of the day.

6. Although I have spoken of vessels having a speed of over 12 knots an hour as the only useful vessels as cruisers, I do not cast doubt upon the good service which may be obtained from the use of vessels under that speed. It is understood that a very large number of steamers are recorded upon the Admiralty List capable of running at about 10 knots an hour. These vessels would be very useful as transports and as store ships; but a special value attaches to some of these vessels which are of light draught and of moderate depth, with 'tween decks laid fore and aft, so possessing great strength and fitness for river or coast navigation. Thus, where light draught of water has to be considered, as in the Baltic, or in Eastern waters, steamers, specially constructed for strength and subdivided in compartments, now engaged in peaceful commerce, would be invaluable as gunboats, or as store ships, or as tenders to men-of-war.

Now here I would say that the employment of merchant steamers for war cannot do away with the necessity for a full strength in the Navy. There must be, in my opinion, a large and adequate supply, and, indeed, a considerable increase in the number of our cruising men-of-war. There is much misapprehension in the country as to the force in reserve which can be supplied by the mercantile marine. You will be surprised to know that there are not one hundred ocean steamers in this country really suitable for Admiralty requirements, and fit to travel over 12 knots an hour; indeed, I may say there are not eighty. Now, we must be careful not to count too much upon our strength. It is well for us to know exactly what strength we have; the Government, whatever party be in power, have to weigh well not only how many vessels of the mercantile marine may be in existence, but also whether they are all equally worth having and available. I venture to say they are not all equally worth having, and I am quite sure they will not all be available when required. Nearly all the steamers of great speed to which I refer belong to companies carrying the mails. The Peninsular and Oriental Steam Company conveying the mails to Australia, to China, and to India, have a very large fleet of splendid vessels; but they are spread over different parts of the globe. The steamers of the Cunard, White Star, and other lines, are available if their owners could spare them from the Atlantic. The Pacific Steam Navigation Company have their steamers trading round Cape Horn, to Valparaiso and Panama, from which distant parts it would be difficult to gather them when required.

Of other companies I need not speak. You have to deduct from the number I have indicated those vessels which will be out of the way at the moment of a declaration of war, and those which would be unprepared to meet the cruisers of the enemy. You have also to deduct the vessels which may have been sold, and you cannot take into account a large proportion of the fast vessels above referred to, which would still be required for carrying the mails. I estimate that you would not have at the call of the Admiralty in case of need one-third, or even one-fourth, of the whole number; but if you had them all, and if they were suitable for war, there is no arrangement made at the present moment for their being fitted to serve as cruisers. You cannot expect the steamers to be at your disposal unless you arrange in time with those who have charge of them, nor may you count (unless preparations are made in advance) upon the despatch of such steamers to sea fitted for fighting in less than three months after fighting was required. But of what service would they be as fighting cruisers? I know some vessels which have been accepted as up to Admiralty requirements which could not carry the guns one would suppose should be in vessels such as I indicate. They might carry one gun, or, perhaps, two guns, and they could do much injury to the commerce of an enemy; but in doing this, how are they to act with regard to the Treaty of Paris and privateering? Are they to be purchased by the Admiralty and used as men-of-war, chasing and destroying the merchant shipping of an enemy?

Privateering I take to be abolished, but Russia appears to have

established a privateering fleet, manned by Russian naval Officers and crews. I prefer to look upon our merchant cruizers as not employed for purposes of privateering, but by way of assistance to the Royal Navy in keeping up communications with our Colonies, and in acting as cruizers carrying guns in pursuit of the enemy's cruizers. Now, in this we cannot be excelled by any Power in the world. All that the country need wish is that the arrangement should be perfected and held in timely readiness. Shipowners have been asked by the Admiralty to furnish the drawings of their vessels. They have given the authorities all the particulars which are required, and at Whitehall the full details of every suitable steamer are in possession of the officials; and yet, although the shipowners were put to considerable expense in preparing their vessels, and although they were assured that the preference would be given to these vessels, there has been no preference whatever given, and owners have derived no practical advantage from having so prepared their ships. The naval authorities must surely see that it is hardly fair to expect that owners will fit their ships at great expense to be employed in Government service for the good of the country when they are left to infer from recent experience that all they have done will not even be taken into account. At this moment there is no definite principle established upon which steamers are selected for Government service. The Admiralty appear to attach little value to the relative coal-burning of steamers, their carrying capacity, or their speed. I consider that steamship owners should be made aware by definite declaration on the part of the Government of the value they attach to these and other qualities, and on what basis they intend hereafter to charter. If this be admitted, the sooner shipowners know it the better. An Admiralty Minute should be issued for the information and guidance of shipowners. Is it not unreasonable that steamers should have been taken up during the South African War which were not on the Admiralty List, some of them with old-fashioned engines burning coal largely at Government expense, in preference to steamers which had been approved as equal to all Government requirements? I venture to state that it would have been cheaper to the country to have given 30 to 50 per cent. more for such vessels as I have referred to.

I will explain to you what were the first intentions of the naval authorities as to the employment of swift steamers belonging to the mercantile marine.

In December, 1875, the Lords of the Admiralty communicated with the principal steamship owners of Great Britain, asking for information as to their vessels, and explaining that their Lordships were desirous of forming a sound opinion on the practicability of a scheme for supplementing the regular naval forces of the kingdom in the event of any sudden emergency. Their Lordships requested to be supplied with such *data* as would enable them to ascertain and record the capabilities of the vessels owned in this country, and the shipowners were given to understand that the Admiralty meant to take into consideration the time within which such vessels could be adapted for war purposes. In common with other shipowners, I placed

the particulars of our vessels at the disposal of the Admiralty; from time to time they were surveyed carefully, and in due course the Director of Naval Construction was enabled to lay before the Controller of the Admiralty, for the information of their Lordships, the result of the inquiries which had been made. It was decided that no vessel was to be considered of real value for the purpose contemplated, unless able to steam for at least six hours continuously at a speed of 12 knots an hour, as a cruiser; but 10-knot vessels were promised a preference over ordinary steamers for general purposes if on the list. Two guns were considered to be the least armament for protection, and it was laid down as obligatory that proper bulkhead arrangements should be provided, with protection to the machinery above the water-line.

It was clearly apparent to the First Lord of the Admiralty that, with the Declaration of Paris abolishing privateering, trade would pass from the belligerents, as neutrals would have the advantages of communication, and that in all probability the greater number of the swift ships of this country, if we were at war, would have to be taken over by the Government of the day. It was pointed out that a difficulty would occur if the vessels which might be accepted as fulfilling the Admiralty requirements were not under the control of the Admiralty in the event of war, and that it was extremely desirable to offer such inducements as would secure the disposition of these vessels. In some cases it was found that merchant steamers had no adequate arrangements to secure safety for passengers, or for the conveyance of troops, or for a sea fight, many steamers having but few water-tight compartments; but it was admitted that if the water-tight compartments could be provided to such vessels as were not so arranged, the result would be very advantageous. Examination showed that there was a goodly number of steamers of certain well-known companies which were properly divided by bulkheads and water-tight compartments, and that these would adequately perform excellent service in naval operations suited to armed ships of war. The difficulty of providing for the fitting of such vessels in an emergency was foreseen. Some of the Officers of eminence who were consulted judged that it would be impossible to get shipowners to subdivide their vessels if not already provided with water-tight compartments, but as a rule the general opinion held by the naval authorities consulted was to the effect, that in a large number of cases the shipowners of this country would be prepared and willing to place at the disposal of the Government suitable merchant ships fitted for war purposes.

It was then virtually decided that a list should be prepared by the Admiralty of such vessels as were obtainable, and that the list should include vessels capable of steaming at different speeds, some at more than 12 knots, and others at 11 knots, and up to 12 knots an hour. But it was stipulated that vessels should be divided by bulkheads, arranged in such a way as to prevent foundering if any one compartment happened to be filled with water.

The information obtained by the authorities compelled an inquiry into the desirability or necessity of building a larger number of cruising vessels for the Royal Navy. It was admitted that such frigates as

the "Shah" and "Inconstant," or corvettes of the "Bacchante" class, or the armed dispatch vessels "Iris" and "Mercury," with perhaps a dozen other swift cruisers, were all that the Government possessed, and for the estimate of cruising power it was not possible to include ironclads. In comparison, it was known that the French had twelve to fifteen vessels of a speed of from 12 to 14 knots an hour. The question then was whether the Admiralty should add to the effective force of the Navy by the construction of a large number of swift armed Government cruisers, or limit the number of Government vessels to be built, and take into the Service as cruisers swift merchant steamers, to be fitted with torpedoes and for use as rams. The general conclusion arrived at by those connected with the Admiralty who were best entitled to form an opinion, was to the effect that if a high speed could be obtained, merchant steamships might be secured by the payment of some annual subsidy; they would serve special purposes with torpedoes; they could act as powerful cruisers against any privateer or improvised cruiser of the enemy; but it was pressed upon those in power that protection from hostile shot or shell would be desirable.

In 1878 the present First Lord of the Admiralty stated in Parliament that, in the event of war, then considered probable, it was intended to arm thirty merchant steamers as armed cruisers; but nothing was really done; it was left entirely to the moment of the declaration of war, which might be sudden, or to future discussion, whether it was necessary to develop such a scheme for the employment of the mercantile marine. The inquiries of the Admiralty had been elaborately carried out, but nothing was settled or brought to a definite point. Now what I have to say is this: that all these inquiries, the information obtained, the arguments advanced, and the opinions given, have resulted in no practical issue; and my purpose in this paper has been, and is to press upon the country the necessity for a decision one way or the other whether anything is to be done. If the authorities do not carry out some practical plan for making use of the merchant shipping of this country, they will know that they have afforded much information to foreign Powers as to the maritime resources of this country, in the shape of particulars of nearly every steamer possessing speed; for we may be assured that every foreign Government is fully acquainted with the details of the vessels referred to. Are the foreign Governments, then, to have the choice of our steamers? Are they to know all our weak points? Will the British Admiralty do nothing to carry out their own first intentions? While saying this I cannot but pay a tribute to the zeal, energy, and ability of the officials of the Admiralty charged with the collection of information. They have done what they could for the national interest in this matter.

You may say that we need not trouble ourselves with the past, but that I should state what I would propose as a practical plan for the future. Let me, then, submit for your judgment a scheme for the employment of the merchant shipping of this country, and you can say whether or not it is calculated to secure the purpose in view. I will

briefly sketch to you what appears to me to be practical, and of great value. Let the Government select ten, or twenty or thirty steamers (if they can find that number) capable of steaming over 12 knots an hour for twenty-five to fifty days without stopping. Engage these vessels upon some such terms as these:—A payment monthly, or by the year, for their retention; have it an obligation on the owners to retain in their employ men connected with the Royal Naval Reserve. Let the Government keep at certain specified places, such as Ascension, the Falkland Islands, Simon's Bay, Hong Kong, Sydney, Halifax, Bermuda, Vancouver's Island, and other strategical points, a sufficient number of men of the Royal Marine Artillery and Infantry with guns, fittings, magazines, ammunition, torpedoes, &c., to be available when required; prepare the necessary means for arming the vessels retained, and which otherwise would be employed in their regular trades.

Take for illustration Simon's Bay. If one or two of the Cape mail steamers are fixed upon, let their guns be kept at Simon's Bay; on board the vessels, place four leading men as gunners, who will assist to train the crew (all Reserve men), and be ready for emergencies; at Simon's Bay let there be a sufficient number of the Royal Marine Artillery, or of the Royal Marine Infantry, properly trained and ready to embark at an hour's notice. The number of cruisers that will be required will absorb all the Royal Marine Artillery we have for instructional purposes, and also the Royal Marine Light Infantry who may hereafter be instructed in artillery duties. Looking to what France can bring into action, we have not a man too many, in fact, we have not a sufficient number of men for the sudden outbreak of war. Fix with the owners of the ships that these vessels are to be ready at any time to be handed over to the naval authorities at Simon's Bay, there to be fitted and to proceed to cruise off the Cape, or off Cape Horn, or towards Australia, or away in China, or wherever required, in the event of war and the appearance of the enemy's cruisers. The knowledge on the part of foreign Powers that, not merely in home ports, but also abroad, a large number of well equipped, properly manned steamers are at hand and available for the defence of our commerce, and as auxiliaries to the Royal Navy, would paralyse such efforts as have been made by the Russian Government for the equipment of the cruisers which they can control.

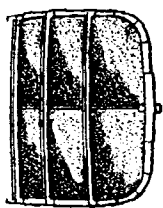
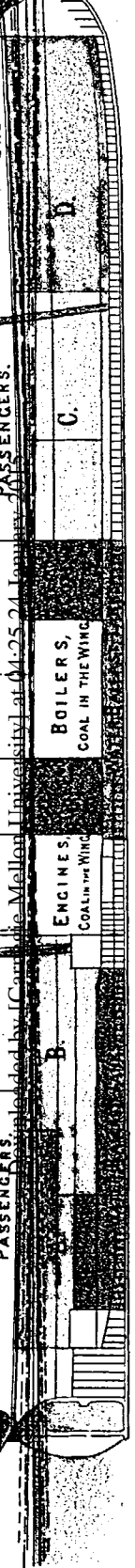
But look at the value such a plan as this would be to the mercantile interests of Great Britain itself, and the confidence it would inspire. The cost would be trifling as a means of maintaining a number of such vessels; it would add a splendid fighting power to our naval resources, as far as men are concerned; and on this latter point you should consider that, upon war breaking out, the Admiralty would have difficulty in manning all the ships of the Royal Navy, or indeed, even a large portion of them. I am sure this contingency should be looked to. The number of the Naval Reserve in 1879 was only 12,000 of the First Class, and 4,962 of the Second Class.

The number of our merchant seamen has not increased very materially in the last twenty-five years. In 1851 we had 136,144 British seamen, in 1878 the number was 172,242. But the foreign element in

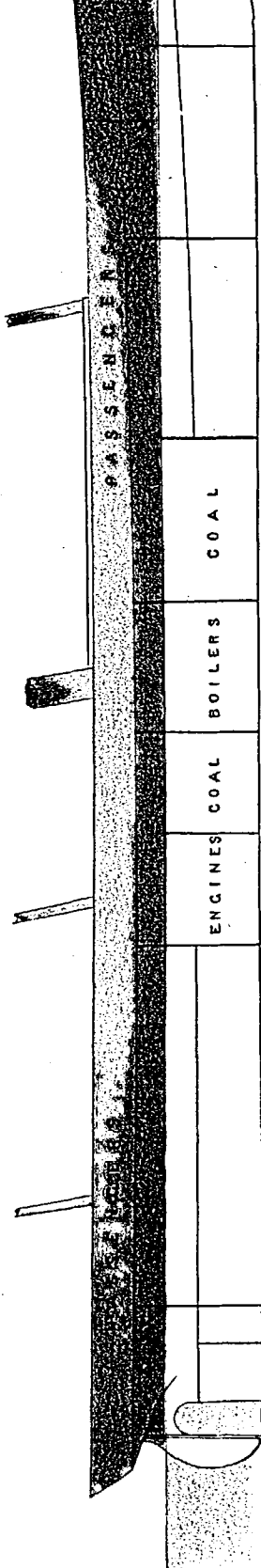
our ships increased in a much larger proportion; in 1851 there were 5,793 foreign sailors in our merchant ships, in 1878 there were 23,343. Now consider this, looking at the increase in the tonnage of the United Kingdom and the Colonies. In 1851 we had 3,337,546 tons of sailing ships, in 1878 4,178,789 tons. But the steam tonnage had increased in a far greater proportion; in 1851 we had 167,398 tons, and in 1878, 2,313,332 tons. It is extremely interesting to look for a moment at the tonnage in British possessions. In 1851 there were of sailing ships 707,785 tons, in 1878, 1,659,355 tons. The steam tonnage belonging to British possessions in 1851 was 20,233 tons, in 1878 it had increased to 178,995 tons.

What reason is there to suppose that shipowners would object to a reasonable arrangement, or that the Captains and crews of merchant ships, supplemented by properly qualified naval Officers and gunners, and adequately supplied with war materials, would fail to give a good account of any cruiser of a similar character belonging to a rival naval Power? At the attack upon the forts of Sebastopol there was no manifestation of fear on the part of hired transports which I might name, whose Captains stood upon the decks while manœuvring to assist in case of need the vessels of the British Fleet closely engaged in action. In the American War, the blockade runners—employed, I admit, in a doubtful service—gave evidence of a daring and a resource which has added to, instead of detracting from, the renown of British seamanship. An immense additional advantage by way of strength to the Royal Navy, and to our maritime power, would be drawn from this union of the mercantile marine with the Royal Navy in the event of war. At present there is so much jealousy between the services that naval Officers cannot get employment in merchant shipping to the extent to which their merits entitle them. The Captain or Officer of a merchant ship has no chance of joining the Navy; but this interchangeableness or harmony of action would engender such feelings of mutual sympathy and support as would present a power of vital energy and patriotic vigour such as Russia, France, or Germany can never be expected to display.

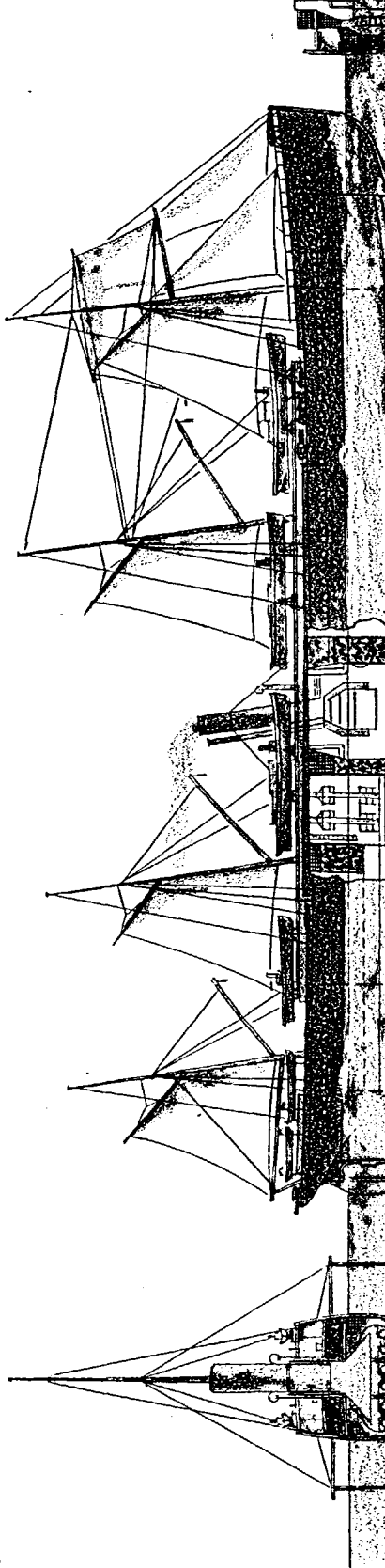
Such an employment of our Auxiliary Force would secure occupation to worthy and able naval Officers. Each steam company, whose steamers were engaged by Government, would require Officers, and the Admiralty would also be compelled to avail themselves of their services. I have often heard with regret able Officers of the Navy, who are anxious for work, lament their constrained idleness. Some such employment as I have just indicated would afford them opportunities for active and useful exertion, and the extra cost to the country would not be equal to the cost of wear and tear of a small ship of war. I see another advantage in the regular employment of naval Officers in connection with the merchant service, namely, the experience which such Officers would gain. At present an Officer on half-pay may have been for a long time ashore, and suddenly finds himself appointed to a position which he has the right, but not the experience and knowledge, to fill. The same remark applies in some degree to engineers.

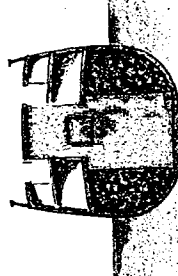
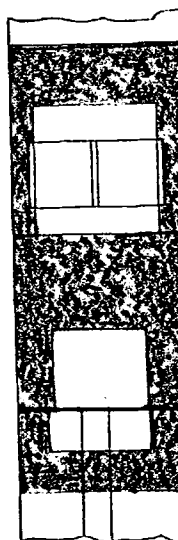
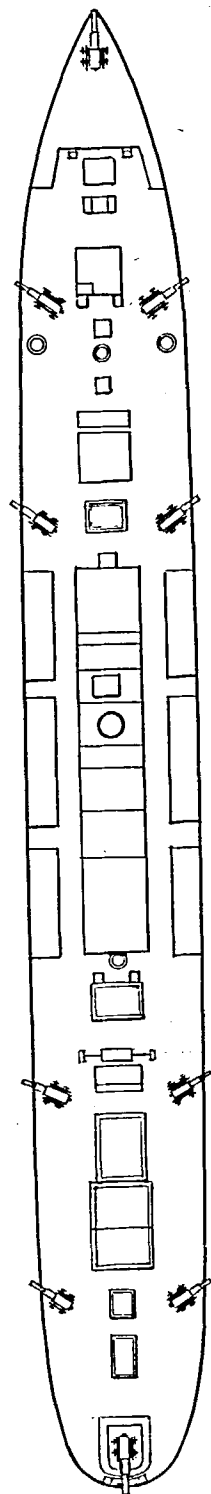
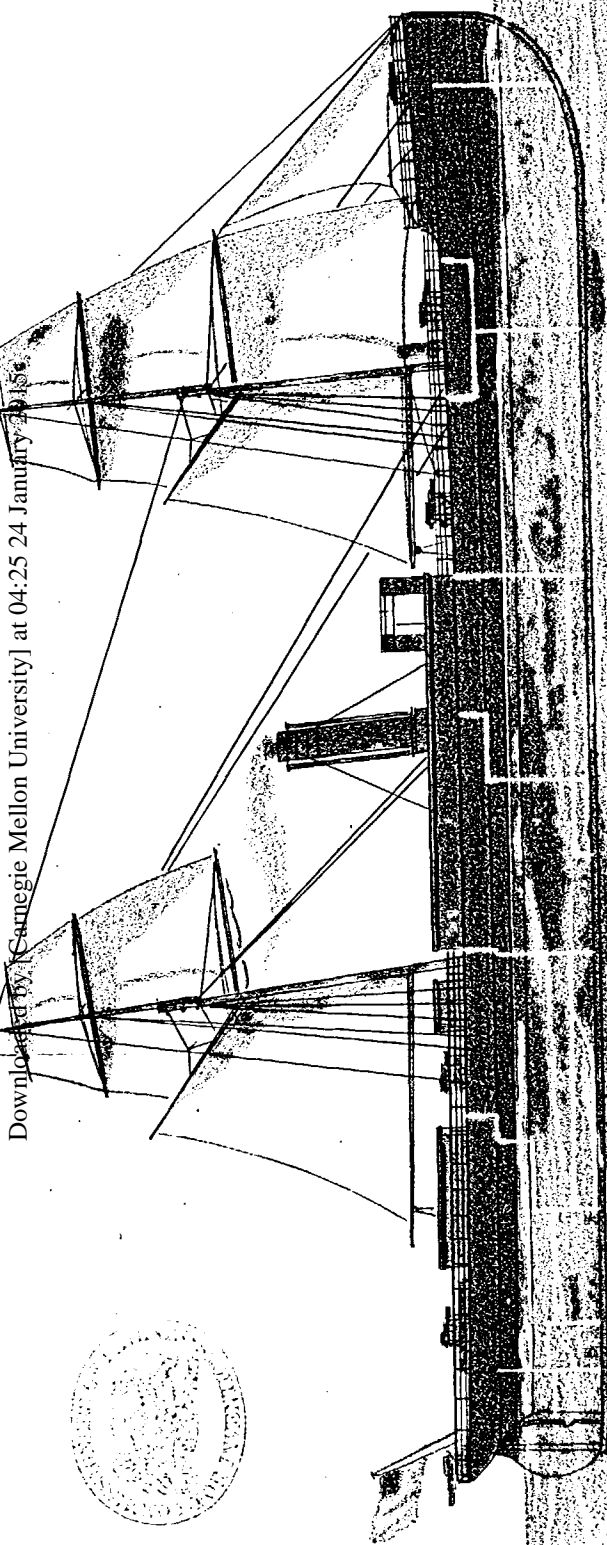


STEAMER A.



STEAMER B.





If there be one thing more surprising than another in relation to our arrangements for a possible war, and the probable closing up of the Suez Canal, it is the absence of a graving dock at Simon's Bay. I would urge that Government docks should be established for Government account at every one of the important strategical points of our widespread Empire. But beyond question Simon's Bay, half-way as it is to Australia and the East, should have a naval dockyard and graving dock suited to the repair of our largest men-of-war. At Capetown the authorities are building a graving dock; but a commercial dock will not serve the purpose of the Royal Navy in the case of war, and the South African station, commanding important sea routes towards South America, as well as towards Australia, India, and the East, claims the earliest attention at the hands of the Government, who ought to ask Parliament at once for the necessary funds for the construction of a graving dock. Is not this important when you remember that between Plymouth and Melbourne or Sydney there is no graving dock in existence for our men-of-war? We had only three men-of-war on the South African coast during the hostilities in that quarter, and two of them, the "Active" and the "Tenedos," having run ashore, had no place where they could be repaired. What would happen if a naval combat should take place off the Cape Colony resulting in the injury of our ironclads or cruisers? and how can we expect these vessels to have the requisite speed if their bottoms are not painted at regular intervals? This is of importance in view of the possible employment of merchant ships as cruisers, none of them being constructed of wood. A heavy ironclad would be unable to enter Capetown docks.

It is useless to think of employing merchant steamers in war, unless we take the supply of coal into account. It is necessary that the coaling stations for our fleets should be fortified. They are not fortified at present, but they should be. The point under immediate consideration, however, is not so much the fortification as the question of the supply of coal—where we are to get the coal if coal should happen to be declared contraband of war? Between England and the Cape two coaling stations at Madeira and the Cape de Verde Islands are in the hands of the Portuguese. Certainly, an enemy's cruiser would have less hope of supplying her exhausted stock in the South Atlantic than we would have, for we could arrange to have coal at St. Helena, or Ascension, or at the Gold Coast. The coal question, in fact, is one of the highest importance, and once it is fixed where the coaling stations throughout the world should be, their fortification must be decided upon as of necessity. The coal must be at strategical points. There are certain admitted bases for the operation of the Navy in the event of war. Bombay, Aden, and Ceylon for our Indian possessions; Jamaica and another island for the West Indies; Halifax and Bermuda for our North American station; Simon's Bay, in South Africa; Singapore and Hong Kong in the East; the Fiji Islands and Vancouver's Island in the Pacific; and the Falkland Islands in the South Atlantic, as guarding the route round Cape Horn. To illustrate this, I may be allowed to refer to the detention which occurred at St. Vincent,

where the cavalry transports sent from this country after the news of Isandula were delayed seven or eight days for their supply of coal. The consequence of the delay was serious to the expeditionary force, and we will do well to take lessons from such misadventures as occurred at St. Vincent. Some of the vessels which were engaged had common, not compound, engines, and consequently burned 70 to 90 tons of coal a-day, at Government expense of course; but the cost I do not look at as of so much importance in the present argument. The delay which took place was serious, and might have been disastrous in its results. If the Government knew in advance the actual coal burning, and in other respects the real state of effectiveness of steamers belonging to the mercantile marine, there would be no risk of such delays as occurred at St. Vincent through this cause.

I have had prepared some drawings to show the arrangement of guns which might be placed in cruisers taken from the merchant service, and I ask your indulgence while I illustrate the relative efficiency in two types of good mail steamers. By way of illustration of the general question, I will compare a steamship, marked on the plan as A, in its power to contend with another merchant steamer marked on the plan as B. I will go farther and examine to what extent such a vessel as A may contest an action with an enemy's cruiser, even if the latter be equal to the swift armoured ships of Her Majesty's Navy. The steamers A and B are of equal tonnage, and both are employed in carrying mails, passengers, and cargo. One or two of the Russian cruisers—the "*Cimbria*," formerly in the German-American trade, for example—is somewhat the same style of ship as B.

The steamer A can carry ten heavy rifled guns (the 64-pounder of 64 cwt., which has a piercing power of 6 inches at 200 yards) on her upper deck, which is of iron covered with teak; the frames are carried up to the upper deck, and are 2 feet apart. The steamer B cannot carry heavy guns on her upper deck, which is of pine 3 inches thick, with fore and aft plate iron stringers only 2 feet or so wide. She must carry guns on the second deck, and her frames are 4 feet apart above that deck. The depth of hold in the steamer A is 30 feet, that of the main hold in B is 27 feet. If both ships are loaded to 22 feet draught of water, A will have 10½ feet of freeboard for the guns, and B will have only 7 feet. You can estimate the difference of effectiveness in a heavy sea. The ship B might carry guns of a small calibre, but not ten powerful guns. In speed the ship A excels the other a knot or two an hour with only 10 tons more consumption of coal. The ship A is rigged so as to be manageable under sail, and, being under nine times her beam, can manœuvre more readily than the vessel B, which is ten times her own beam. The strength of the upper deck of ship A would enable her to carry two torpedo-boats of the second class now in use in the Navy; also the new 48 feet lifeboat steam pinnace, which is also used in the Government service as a torpedo-boat; but the ship B could not, without important alterations, carry any such boats. These steam-pinnace torpedo-boats, built by White, of Cowes, steam 13 knots; the weight of each boat is 8 tons, including engine and spare gear, not coal (of which she

can carry 2 tons); they are diagonal-built, of two three-eighth inch thicknesses of mahogany, with 15 inches of air space the whole length of the boat, and a separate compartment fore and aft. They have the advantage over the steel boats in being easily repaired and got ready for service if injured. The late accident to the "Hecla's" steel torpedo-boats proves how quickly they can be rendered unserviceable. In a naval engagement the cruiser would have a powerful assistance from one of these pinnaces lowered into the water during an action.

Along the whole of the second passenger, or gun deck, there is no bulkhead in the ship B for the case of fire: the ship A has seven bulkheads on that deck. The pumping arrangements of these two vessels, as I have already indicated, are different; in A you have auxiliary boiler power above the water line, and consequently available if the fires under the main boilers are extinguished; in B the donkey boiler is in the engine room, and all fires are on the same level. Now, if these two steamers were offered to the Admiralty for charter by their respective owners, their fighting value, or ability to keep afloat, would not be taken into account, any more than their coal burning. As for fighting qualities, bulkhead arrangements, or ability to cope with or escape from an enemy's cruiser, that never has been taken into consideration, although shipowners, as I have already said, were led to believe that the Admiralty desire the special qualities mentioned, and have urged shipowners to provide them.

Let us look at the ship A in combat with such vessels as the "Volage," the "Mercury," and the "Hecla," all of Her Majesty's Navy. If we take the "Volage" class we find a capacity to steam 14 or 15 knots at full speed, carrying only $3\frac{1}{2}$ days' consumption of coal; the ship A for 12 knots' speed can carry 55 days' coal, for 13 knots, 48 days' coal, and for 14 knots, 40 days' coal, with space for a battalion of troops, and with full supply of ammunition for her ten heavy guns. The "Volage" has eighteen guns; she has no armour. You can judge whether the "Volage" is so very much superior if you take into account the inability to remain at sea away from a coal station. She is fully rigged and can cruise under sail, but in all probability she would be encountered on a cruise by ship A at a great disadvantage, for she would require to have her fires banked when at sea on a cruise, and this means consumption of coal, and her supply is limited. I think ship A could steam at the same speed 1,000 miles with the same quantity of coal as the "Volage" would burn in getting over 350 miles.

Then there is the "Mercury," a steel twin-screw corvette. She can stow 750 tons of coal, and her speed on trial was 18 knots, burning about 200 tons per day. That is to say she might go full speed for a little over three days. In a fight with the ship A she would manœuvre well with twin-screws, but she can carry no heavier guns; she carries the same armament as I venture to allow to the ship A. The "Mercury" and her sister ship the "Iris," cannot be handled with advantage under sail; they have small sail-power, and, indeed, I question if they would steer at all, as they have to drag their two screws.

Let us take the "Hecla," supposed to be a type of the ordinary merchant ship. She is long, and draws much water; her speed is under 12 knots at sea; and she carries only five 64-pounders and one 40-pounder Armstrong gun. Owing to her great length in proportion to her beam she cannot manœuvre in narrow waters, or turn quickly. On the principle of carrying all our eggs in one basket, she is fitted to carry for the fleet six torpedo-boats. I set her aside, as at present arranged, as of no great value in a fight on the high seas with a swifter opponent. As a cruizer she has not sufficient speed. The "Hecla" has on board mining stores for either the defence of harbours or to be employed as counter-mines for the destruction of an enemy's mines; also a large quantity of electric cables stowed away in tanks. But she is the only vessel in Her Majesty's Navy so fitted.

In estimating the value of merchant steamers for war purposes, we must not overlook the protection to vital parts secured by coal. It would be easy to improvise protection along the sides of the engines or boilers by cotton bales or coal; and if we take coal, the experiments in the "Oberon" already referred to are instructive. The powerful 7-inch 90-cwt. gun, placed only 150 yards from the coal armour which was stowed on board the "Oberon," failed to perforate the bunker. The heaviest charge of powder allowed for such a gun was used, as well as the heaviest bursting charge for the shell. The projectiles penetrated to depths varying from 3 to 8 feet; but in no case did either shot or shell get through into the ship, nor was the ship injured or the coal set on fire by the shells bursting in the coal; and with the exception of small holes in the skin plating made by the entering projectiles, there was no apparent damage done to the ship; so that had there been machinery behind this bunker it would have been as free to work after the heavy round of firing as at the commencement of the mock action. In the action between the unarmoured vessels "Kearsage" and "Alabama," the former managed successfully to protect her sides by chain cables. If we take the fight between the "Huascar" and the "Shah," it is a marvel that the latter vessel, which was unarmoured, escaped destruction.

I throw out these suggestions for your consideration. I admit at once that a larger study might have produced for you a more fruitful gathering of *data* and of argument. It may be, and I trust it will be, the means of drawing the attention of the public and the authorities to the matter, so as to secure a thorough investigation of the subject. We have, as a people, our fits and starts in respect of the reform of our naval and military administration. Some will say, "Why raise these questions; we have gone on well hitherto." Others will say, "Build more ironclads and more cruizers, and let the mercantile 'marine alone.'" I trust this question may not be made a party question, or one of economy merely. Economy is a very good thing, but there is also an "ignorant impatience" of taxation. There is more than that—there is an impatience of the duty of national effort. This country does not object to pay for an efficient Navy, the right arm of the country; if fully persuaded of the necessity, there would be no refusal to supply adequate means. What the

country objects to under all administrations is the ineffective use of means to secure the national purpose in defence and in readiness for war; and it is as patriotic to urge for the necessary expenditure as it may be popular to clamour for a reduction of the burdens upon the people of the country. I am now treading on delicate ground. One great and permanent difficulty in the way of a comprehensive, effective, and consequently really economical arrangement for the expenditure in our Army and Navy, is the change, according to the present constitution of the War Office and the Admiralty, in the directing power with each new Administration. I am not sure that we might not be more efficient with permanent Officers, charged with the practical oversight of our national forces. This is a matter which concerns the mercantile marine as well as the Navy. I might ask if you remember the discussion with regard to the efficiency of the Navy opened up by the late Mr. Ward Hunt, when he became First Lord of the Admiralty, who declared in Parliament that out of 41 sea-going ironclads, of which 5 were building, only 18 could be considered effective at that time, and that only 9 out of 14 coast defence ships were fit for sea.

I may here refer to the appointment of a Commission, which is now sitting, to inquire into the best means of providing for the defence of our Colonies. The specific objects to be considered are, the condition and sufficiency of the means, both naval and military, available for the protection of the more important seaports within our colonial possessions and their dependencies, and of the stations suitable for coaling, refitting, or repairing our men-of-war. The Commission is also charged with the duty of suggesting such measures as may seem necessary to provide for the protection of the commercial interests of the whole Empire. The task is a highly important one, and the distinguished men who are charged with the duty of this inquiry will be well entitled to the gratitude of the country if they can practically secure the due consideration of the means to be employed in the national interest.

The questions to be opened up by the evidence and discussion are of far reaching scope, and must be embarrassing, for we have yet to formulate a colonial policy in harmony with Imperial interests and aims. Am I not right in stating that the Colonial question is of as much importance to us as any questions affecting Turkey? and this Colonial question is still unsolved, nay, I may say, still even unconsidered. The people of this country never turn their attention in good time to questions of policy. Our leaders of public opinion, the statesmen who should make national welfare and development their study, very often think more of party successes than of working out in harmonious concert the best national policy. I am satisfied that in the course of time the Colonial question, the question of an Imperial federation to unite in one compact mass the people of British race who are spread over the globe, has yet to show itself as a force to be estimated and employed. It may be remembered by some who hear me that not many years ago, when it was considered by certain politicians to be an open question whether we should hold our Colonies or not, the public feeling in Australia took the shape of inquiring

whether in that distant part of the world it might not be as well to be free from a connection with Great Britain which, in the threatenings of war at that period, left them in doubt whether the Imperial forces could be spared to help them, in fact, whether they had not to expect that they would be left to defend themselves in a struggle which they had in no manner assisted to provoke.

In the paper which I read before you three years ago, I used these words with reference to the question of colonial defence: "Looking to the wide-spread dominions of England, and to the growth of opinion favourable to a closer union between the Colonies and the mother country, could it not be possible to arrange in advance for combined action in the event of war? Might not each Colony, according to its importance or ability, have its own guard ships or defence vessels, fitted at a given moment to combine with the Imperial ship or squadron near its coast, or even to join in a larger enterprise?" In the Colonies there might easily be organized a powerful reserve of Officers and men for naval service. The Colonies might also join the mother country in the cost of colonial defence.

In due course we shall know what the Royal Commission on Colonial Defences will report. At the same time I might ask why the country has had to wait until now for the appointment of such a Commission to consider the questions of colonial defence, coal stations, &c., which we discussed here together in March, 1877, and which have for years been pressed upon the country. This is not a party question. We have our national honour to defend and uphold; the defence of our Colonial Empire is at stake; the food supplies for our population have to be secured; our maritime and commercial wealth and standing have to be maintained. How are we to secure these, and the blessings which we enjoy in our free institutions, if we do not recognise our national responsibility and take adequate and timely means to defend and maintain our position?

What country was considered better prepared for all eventualities than France before the war with Prussia? And what an awakening when, as the result of the terrible conflict, we saw a humiliated and dismembered country under the dictation of a victorious people whom the war united and made a nation. The people of this country may well lay the lesson to heart. The lives lost to France, the value you may care to attach to Alsace and Lorraine, we are unable to estimate; but one thing in the financial calculation of the Franco-German War will come home to us as a practical people. That is to say, apart altogether from the enormous penalty which the conqueror claimed and exacted (over 220,000,000*l.* sterling), there was as much cost to France in the shape of indemnities to the departments which suffered by the invasion as the whole naval and military operations had entailed upon the country. I do not say this country will be invaded, but the contingency is not an impossibility; any of our dependencies may be attacked and may suffer enormous injury. It has been estimated that France lost not less than 1,000,000,000*l.* sterling one way or another by the German war, and the annual charges on the Budget have been increased by 25,000,000*l.* sterling. We have suffered no such defeat as the French,

but we have had our warnings, and we cannot be free from the responsibility and the dangers attaching to our extended Empire. It is for this country to make suitable arrangements in time to protect our dominions both at home and abroad, and this can only be secured by a comprehensive union of our national forces, and of these not the least is the British mercantile marine.

Emergencies will suddenly arise; some question or other will call for sacrifices or settlement. I am satisfied that when the time of danger comes, the mercantile marine of this country, judiciously employed, will have the spirit to respond, as it has the power to be equal, to any claim which may be made upon it; and it may be that to-day we have assisted together in the furtherance of a practical and useful examination of our resources in a suitable adaptation of our mercantile fleet to purposes of war.

Admiral Sir WILLIAM KING HALL, K.C.B.: This is no new subject to me, for I had the pleasure of supporting Mr. Currie in this theatre three years ago. Having served at the Cape of Good Hope, I recognised the absolute necessity for more dock accommodation, and I believe that this country is greatly deficient in docks. Mr. Currie has stated that there is no dock between Plymouth and Melbourne or Sydney. There was a Dock Committee fifteen years ago in the House of Commons; I wrote to that Committee to point out a place at Falmouth, Carclase Point, near St. Just Pool, available for a dock, where there are 4 fathoms of low water at spring-tide, the most western port of our land, ready either for disabled ships to come to, or for outward-bound ships to depart from. I also, when Admiral Superintendent of Devonport Dockyard, wrote an official letter as to the difficulties in war time from want of docks, &c. I will now read portions of that letter.

"I propose that all companies having Government mail contracts should enter their crews for three years, and that all their Officers should remain for six months, which would afford the Government time to appoint their own Officers, should it be desirable. Government to grant pensions to those who might become disabled. For example, any man losing a limb, or becoming crippled whilst in the mail service, should receive a pension, as an inducement for the best seamen in the nation to enter; that nine years' service in Government contract vessels, and three years in a ship of war as able seaman, with a very good character, should entitle him to 8*l.* or 10*l.* a year, and his services should be available in the event of war. Thus twelve years of the best of a man's life would be at the service of the country, a fair amount of force always afloat, without the cost of victualling. Greenwich Hospital to be open for them in old age.

"That the vessels be fitted for guns, with 100 rounds per gun, and have them on board. All to be in charge of a gunner's mate, paid and victualled by the Crown. Once in six months the guns should be exercised and inspected by a gunnery Officer. An annual promotion to the rank of gunner as an incentive to the gunner's mates.

"All other incorporated companies should have guns appropriated and bull rings if necessary, fitted, and the stores kept at their wharves, and mounted once in six months.

"A sudden declaration of war, instead of creating a panic, would enable us in our strength to annihilate at a blow the Power or Powers opposed to us. Commanders-in-Chief abroad would find a well-manned force at their disposal, protecting our commerce, and destroying the enemy's."

This was written twenty-eight years ago, when I was Captain of the "Styx," during the Kaffir War, before the Continuous Service or Naval Reserve were established. We want to rise above party considerations, and to get the country to believe in the necessity for a strong Navy, and that this Navy wants docks. The building of iron-clads was commenced by Louis Napoleon plating his ships with 4-inch armour. Well, you advance to 8 or 10 inches, that is plating with silver; you go on to 14 or

16-inch layers, that is plating with gold; you invent a torpedo, which costs 100l., and you send that ship to the bottom. It takes years to build these immense vessels, and their cost is so tremendous, that I should scarcely like to run any risk with them. I would not care to chase an enemy much in shore in a ship worth a million of money which, if lost, would require seven years to be replaced. We want in place of these ironclads a host of gunboats and coasting vessels. Denmark, in the old wars, relied upon her gunboats. Let me give you a bit of history, when in 1808 the Treaty of Tilsit armed everybody against us. See what our glorious ancestors did. Here is the King's speech in that year: "We are commanded "by His Majesty to inform you that no sooner had the result of the negotiations of Tilsit confirmed the influence of the control of France over the Powers of "the Continent, than His Majesty was apprised of the intention of the enemy to "combine those Powers in a general maritime confederacy to be directed to the uni- "form subjugation of this kingdom, or imposing on us an ignominious peace."¹ We had against us France, Denmark, Portugal, Russia, Austria, Prussia, and our old friends the Turks. What took place? Ninety pennants and 30,000 troops within six weeks started for Denmark, bringing back their fleet, while another squadron convoyed the Portuguese fleet over to the Brazils, and at that same moment we were forcing the Dardanelles. But what would we do now, in such circumstances? The population at that time was 13,000,000; now we have 34,000,000, and our Colonies. Another step taken by England was to issue letters of marque. By the Treaty of Paris the right arm of England has been destroyed. The reply to the King's speech, from which I have quoted, was carried in both Houses *without* a division, and why? Because in both Houses they had naval Officers to guide them, whose opinions were respected; they had twenty-one Admirals and Captains in the Commons, and fourteen in the Lords. We had 30,000 of the best seamen in England in these letters of marque. What we want is a fleet of gunboats. I do not believe that Treaties are worth any more than the paper they are written on. In 1839, when I was in the "Benbow," with Sir John Hay, we had an economical Admiralty, and they thought it well to have peace complements for the ships, and so they took a hundred men out of each line-of-battle ship. What happened in the Mediterranean? There were twenty-five sailing line-of-battle ships belonging to the Egyptians, which the Turks turned over to them in Alexandria, and there were three English line-of-battle ships keeping them in. Our whole force in the Mediterranean was ten sail of the line, each ship having 100 men short. At Salamis Bay there were ten French sail of the line, each having 100 men more than we had, and orders were sent to the French Admiral, if he thought he could insure success, to start and capture the English fleet, and when he had done so, to send word to his Government, and they would immediately declare war against England. We want the country to realize that the Navy is the right arm, the left arm, and heart of the country; its very existence depends on it, and when the Navy Estimates are brought forward, a greater number of members should take an interest in them. I have seen as few as twenty in the House whilst millions have been voted, and at other times a long discussion because the party in power had failed to build the number of tons they promised a year before. For instance, when I was at Devonport

¹ "His Majesty has commanded us to state that in consequence of the decree by "which France declared the whole of His Majesty's dominions in a state of blockade, "and subjected to seizure and confiscation the produce and manufacture of this "kingdom, His Majesty resorted in the first instance to a measure of mitigated "retaliation, and that this measure having proved ineffectual for its object, His "Majesty has found it necessary to adopt others of greater rigour, which he com- "mands us to state to you you will require the aid of Parliament to complete and "give operation to."

Now for the result.

"July 4th, 1808. Parliament prorogued.

"The sanction which you have given to those measures of defensive retaliation to "which the violent attacks of the enemy upon the commerce and resources of this "kingdom compelled His Majesty to resort to, has been highly satisfactory to His "Majesty."

Dockyard, we commenced building, but the flying squadron came home with three frigates to be refitted; the new work had to be set aside. Mr. Currie mentioned that the conditions required by the Admiralty for adapting some of his steamships for war purposes had been complied with. Owners who, when building ships, adapt them for future war service, should have an annual grant for such vessels. When the Treaty of Paris was being considered, I read that those able diplomatists separated for a day because they could not agree as to the value of a word. But they signed away the birthright of this country, the power of letters of marque, when with our Brasseys, Curries, and others, the sea should be covered with such cruisers.

Admiral Sir SPENCER ROBINSON: My Lords and Gentlemen, I wish to bring back the discussion to the important subject to which it belongs. There is no question that everyone here must feel extremely indebted to Mr. Donald Currie for the very able and elaborate exposition he has made, not only of a subject which relates to the actual state of the Navy as to its adequacy or otherwise, but also as to the best method of supplementing any deficiencies that may be found, should we unfortunately be mixed up in hostilities. In the main, with almost everything that Mr. Currie said, I concur; but we must all admit that the subjects he has treated are so diverse and so numerous, it would take so long to enter into the very many details over which such a subject has necessarily ranged, that only a very general concurrence, if there be concurrence, or criticism, if there be criticism, can be given to what he has so ably brought before us. The fact of the insufficiency of the armed Navy of this country to defend merchant ships all over the high seas, and on their arrival at the ports of this country, must, I think, be evident to every thoughtful man. It is not pretended that we have a sufficient number of armed cruisers to defend a flag which is at this very moment floating in almost every latitude and longitude that can be named, and it would take an expenditure which is really a matter of serious moment to produce anything like an armed force that can defend such a mercantile marine as we possess on those seas. Mr. Donald Currie three years ago brought forward in this very theatre very many of the opinions that he has now advocated and illustrated with great facility of expression, and with so much thoughtfulness and minuteness of detail. I myself should most strongly urge upon everybody who has any power whatever of influencing the destinies of this country, whether by speech or by writing, whether in the House of Commons or out of the House of Commons, to look seriously upon the point put before us to-day, namely, that the mercantile navy of this country can render an important assistance to the Imperial Navy of this country, and that that assistance is needed in every possible way. The points that he has brought forward are deserving of our most serious discussion. The question of arming the merchant ships is not to my mind quite an easy one, nor can it be so readily dealt with, I think, as Mr. Currie appears to suppose. We want to hear more about the weights that are proposed to be put into a ship, about the displacement that would follow on putting those weights in. When we have armed the merchant ship as he proposes to arm it, we should require to know what sacrifice of other weights, cargo, coal, stores, provisions, that a merchant ship must needs carry, would have to be made in order to allow of such a ship carrying ten 64-pounders with 100 rounds of ammunition for each gun.¹ If the ship is to carry that weight of armament, there must be a great sacrifice of something that the ship now carries, and her distinctive feature of a trading ship is compromised. I think myself that every merchant ship that can be made able to defend herself should be induced to do so, and the way in which, in my opinion, a merchant ship can more thoroughly be defended than in any other, is by the use of the Whitehead torpedo. A small number of Whitehead torpedoes in such a ship as Mr. Currie has referred to, in my opinion, would be a far more efficient defence against the attack of an armed merchant ship, carrying much coal, and with great speed, that had been bought for the purpose of the destruction of our commerce, than the number of guns that Mr. Donald Currie has proposed. But, after all, that is only a detail. The principle on which we are both agreed, the

¹ Mr. Currie explained that I had misunderstood his proposal, and that the ships, while engaged in commercial pursuits, were not to carry the proposed armament, but only to be prepared for it.

principle which I, in my small way, have advocated in every possible manner is, that as an assistance and supplementary action to the Royal Navy, we should enable the merchant shipping to defend itself. The Whitehead torpedo may not be a better thing than ten 61-pounders; but it is a subject worth discussing, and these are the details which it is impossible, within the limits of time allowed us, to discuss with any efficiency. I am not so fully persuaded as Mr. Donald Currie seems to be that the armed merchant ship is good for attack. I do not think the attack of any of these merchant steamers against a regular man-of-war, however small, would be likely to be successful. The arrangements of a ship of war are so thoroughly moulded upon ideas of fighting, that you would really have to place in each of these merchant vessels, if you got them for an attack, a man-of-war's crew, a man-of-war's practice and experience, and the whole objects for which a merchant vessel exists would pass away. But still that does not in any way lessen the force of what Mr. Donald Currie has said; that all these fast and large merchant ships should be prepared to defend themselves. I may say one or two words on that head, because my attention has lately been considerably called to it. We have, in comparison with those who might be hostile to us at any moment, not a sufficient number of swift armed cruisers to give the protection which defenceless merchant shipping requires. We have a large number of cruisers that are slow vessels, whose speed is limited between 9 or 10 knots and 13, and we might find ourselves in opposition to people who had built ships to go 16·9 knots per hour, and have smaller vessels and lighter vessels whose speed is 16 knots, and who descending from class to class, end with a small vessel of 15½ knots. Unfortunately in this country we jump from very few vessels whose speed varies from 15 to 16½ knots down to a large number whose speed is but 13, and a great part of our cruisers are vessels of even less speed. I think that a merchant vessel exposed to the attack of a swift man-of-war, however small, that could go these 15 or 15·5 knots for a very limited period, would be very badly defended indeed if she were only to trust to the guns she could carry, or to the armament, however heavy, of a cruiser that could only go 13 knots. The argument, moreover, that in the construction of ships for the defence of our commerce great speed is absolutely necessary will find itself proved and brought out by the effort which has been made by other nations to attain vessels possessing such powers, combined with an armament which would defeat, in my opinion, anything that an armed merchantman could do. It would take up too much of your time if I were to deal with the rest of the subjects brought forward, and I will not say anything further, except this. It is impossible to conceive how the minds of the statesmen of this country, however great may be their willingness to preserve peace, and however strongly they may hold that every war is an iniquity and an injustice, can escape from the certain conviction that we may have war forced upon us whether we will or no; and that if war is forced upon us, the efficiency of our Navy either to defend these islands or to protect our commerce, depends upon the supplies of coal in different regions of the world; how they can have allowed, in spite of all that has been said here and elsewhere, and all that has been written and spoken from time to time, coal depôts not to exist where they are wanted, and such coal depôts as we have to remain unfortified, is to me one of those mysteries that no one can understand. I would urge upon everyone to forward in every way he possibly can the views that Mr. Donald Currie has laid before us on the subject of the merchant navy assisting to defend itself; for I know, and I believe no one can doubt it, that the inability of the British Navy to protect our mercantile fleet is a matter of notoriety to foreign Powers and of apprehension to ourselves.

Capt. J. C. R. COLOMB, R.M.A.: I think anyone who knows anything of this subject must feel that the general question raised by Mr. Currie is about the most important and most serious that Englishmen can discuss. The most remarkable feature of our history with regard to this matter is this,—that while our commerce has been growing and developing by "leaps and bounds," our naval policy has been shrinking by "fits and starts." First of all, I will take the general policy. Our naval policy has been a retrograde policy in two respects: first, a cutting down of the brain power of the Admiralty as mentioned by my brother in this theatre last year. Anyone can satisfy himself of that by comparing the Admiralty List of past years with the present Admiralty List. Public opinion, in ignorance of the duties of the Admiralty

has so insisted upon cutting down the administrative expenses of the Admiralty, that the arrangements for the defence of our great sea Empire now rests on the shoulders of three naval Officers, who, from the ordinary routine of the business of the office, have positively no time to devote themselves to the thorough consideration of these great questions. Another instance I will give you of the retrograde policy of this country is this: For 230 years the Royal Navy of England had a great mercantile auxiliary. The original possession of the island, so important as a military position to the safety of Mr. Currie's fleet—St. Helena—is due, not to the action of the Royal Navy, but to the East Indiamen. From 1600 to 1830 every one of those vessels was really a man-of-war. Their crews were trained, and their discipline based exactly upon the lines of a man-of-war. It was the auxiliary fleet of England; but in 1833 that whole fleet was put up at auction, and knocked down by the hammer of the auctioneer, and the Navy of England was left without that auxiliary; but it had another. The Bombay Marine then existed, and no sooner had the East Indian fleet been abolished than we created on a larger principle the Indian Navy. That had its time. It grew and flourished until 1863, and then was abolished, and the Navy of England was from that date left alone without any auxiliary power whatever. Between 1830 and 1863, the local naval resources the British Empire had created in Bombay dockyards turned out about 30,000 tons of men-of-war; some of them 80-gun vessels; several 18-gun frigates. We have wiped these resources all out now, and you are trusting the maintenance of your naval power all over the globe to the few dockyards that we have in the United Kingdom. I agree with what Sir Spencer Robinson has said, that really we cannot be too earnest about this. The country will have a great opportunity to-morrow of really learning something that it is well it should learn from Mr. Currie's paper. Mark this fact, showing you how retrograde our policy has been from a national ignorance of our real wants. In 1833, when an auctioneer's hammer disposed of this great auxiliary of nearly fifty ships—I do not dispute that the natural course of events necessitated it—we substituted nothing in its place. Our Navy Estimates were then nearly 5,000,000*l.*, and our total export and import trade was, in annual value, 85,000,000*l.*—less than the export and import trade of Australia at the present moment—what is the case at present? Your Navy Estimates are just over 10,000,000*l.* without any auxiliaries, and your export and import trade is 600,000,000*l.* per annum. With regard to the great question of arming the mercantile marine, there is one very important matter to be remembered, and it is this: the shipping of your mercantile fleet will be bid high for by neutrals on the declaration of war. All history shows this. The American statesmen of to-day tell us so,—that it will be the interest, and must be the interest, of a neutral Power to bid enormously high for our ships on the outbreak of war in order to take our carrying power away from us. That, therefore, has to be considered, as influencing the policy of trusting too much to your mercantile marine which, at the moment you most want it, may disappear behind the neutral flag. With regard to seamen the same argument applies. It must be remembered that a seaman's occupation is a marketable trade, and that they will also be bid high for; and we know, as a matter of history, that Pitt found the great national difficulty in the time of the greatest national trouble was the rapid and wholesale transfer of our shipping to neutral flags. That shows the value of Mr. Currie's enforcing upon the attention of the country the necessity of making arrangements in time, knowing that these difficulties await us. Knowing that these will occur when war breaks out, we must prepare to meet them. With regard to coal, I am very glad to see Mr. Currie has not fallen into an error, which some eminent authorities have recently done, in stating that coal is contraband of war. The coal depot defence question is now in the hands of a Royal Commission, and we must leave it there. The same is the case with reference to docks, and therefore I will not say anything more on that point. Having protected your coal depôts, there is another matter to be considered. You have secured the protection of your own supply, but have you made any arrangements to prevent supplying your enemies with British coal? I think I will show you that you have not. I will take one ocean alone, and I will take that ocean with which Mr. Currie has most to do, so that if I fall into an error he will be able to correct me; I mean the South Atlantic, which, as you know, is bounded on the west by South America, on the east by the coast of Africa, and on the south by the

Antarctic Ocean. Take the case of war in that ocean, and let me tell you the defence of that which appears to some a remote part of the world is a very serious question for every one of us at home. Referring to a paper which I prepared for this Institution twelve years ago, I find the actual money value of the imports and exports coming from that ocean, or going there, is 27,000,000*l.* The traffic round the Cape I estimated at 91,000,000*l.*, and the traffic round Cape Horn at 40,000,000*l.*, making a total of about 150,000,000*l.* Lord Carnarvon has since stated that only 60,000,000*l.* goes round the Cape, and therefore the total value of that ocean to Great Britain at this moment may, at any rate, be fairly put down at 120,000,000*l.*¹ That is a money area which the British people will understand, and should take measures for protecting. But now listen to this: There is about 6,000,000*l.* of gold continually coming across, and about one-seventh of the total wheat supply for the population of these islands also crosses that ocean. About 7,000,000 quarters of wheat came last year. Then as to coal. I find more than a million tons of English coal crossed that ocean last year, and of that quantity under 150,000 tons only were going to places in British Possessions. The Royal Commission will, I have the fullest confidence, adequately provide for the defence of your coaling stations, but it must leave in that ocean 850,000 tons of British coal really unprotected and available in neutral ports for the enemy. I find on the western shores of that quarter of the globe they take on an average nearly 400,000 tons. What does that state of things involve? Your preparations in war will involve guarding the neutral points where that coal goes to, and how is that to be done? By a fleet of observation off South American ports, and that will immediately cause an increased demand for your fleet. If you have a war, what are the demands on your Navy and on your mercantile marine? The first thing is to blockade all the enemy's ports. Has anybody any idea at all what force would be absorbed of the Royal Navy in blockading a possible enemy's ports? At the time of the American War, Mr. Wells called in eminent shipowners to give advice as to what they were to do with regard to naval affairs. They bought twenty sailing vessels, and they gave it as their opinion that if they bought thirty more sailing vessels they could seal up the ports of the South. That was the idea the best authorities of the American nation had of the requirements of a blockade, but experience showed how far they were from being right. It took 600 vessels, most of them steamers, and then they did not succeed in blockading the enemy's ports. Take any coast you like, and see, after providing for blockade, what margin you will have left for the defence of your own commerce; you will have very little. Of the force you will have left you must place a squadron at the Equator, and between the Equator and the defended station of the Falkland Islands on the one hand and the Cape on the other, you will have your commerce passing still quite unprotected unless you follow the advice of Mr. Currie and look to this matter in place. There is one other point to which I must draw attention, and that is with regard to the men. I have given you some idea of the demand you would have for ships, and therefore how necessary it is to prepare for it. Now let me briefly draw attention to a rule of thumb calculation with regard to trained men. The constant trade as represented in shipping tons of British steam-ships to and from ports in the South Atlantic amounts to over 200,000 tons. Suppose that one-half of that tonnage is available for carrying guns; a fair estimate may be struck by allowing one gun for every 300 tons; 100,000 tons will give you, therefore, 300 guns, and allowing ten men per gun for fighting duty, &c., if you arm but one-half the steam tonnage regularly plying to that quarter of the globe, you must therefore be prepared to give these steam lines at once a force equal to 3,000 trained men. That is only one quarter of the globe, the other three would take 9,000 more. I could go round the globe and show you in this rough way our necessities on every ocean. I ask you to remember what Mr. Donald Currie says in conjunction with this fact of the paucity of England's naval power as regards trained men. I cannot sit down without

¹ Since the opening of the Suez Canal, it is not possible to calculate with exactness the value of commerce passing round the Cape. Some ten years elapsed between Lord Carnarvon's estimate and mine, and in the interval the increase of commerce adopting the Canal route in preference to the Cape has been great; this in some measure accounts for the discrepancy.

expressing my own personal feelings with regard to the way in which Mr. Donald Currie has brought this question forward. I think it was Swift who said that the man who made two ears of corn to grow where only one grew before deserved better of his country than the whole race of politicians and patriots put together. When Swift uttered those words we grew our own food, and could take it from the fields to the mouths of the population; but if Swift lived now he could hardly draw the same comparison. We are now dependent even for our very food upon the traffic of the sea, and I would say, if I may be allowed to paraphrase so great a man's words, that the Englishman—in the state of affairs I picture, of a huge population dependent upon the safety of the sea and the traffic of the sea for its food—who makes two steamers to ply where only one plied before certainly deserves well of his country. This paper has a treble value; it has its intrinsic merit and its inherent worth, and the more one knows of the subject the more one sees its breadth and depth. I think it exceedingly fortunate that at this moment, concurrently with Mr. Currie's paper, we have Sir Spencer Robinson's article in the *Nineteenth Century*, and the thinking portion of the British people taking these two papers in conjunction and calmly weighing them, will have serious ground for apprehension as to what might happen if we become suddenly involved in war. Mr. Currie's paper is not only valuable for its intrinsic worth, but it is valuable in that it comes from the source it does, from the mind of a practical shipowner, and it is valuable also because, coming from a civilian so well known, it is quite certain to command the attention of the public, by the force of whose opinion we are governed.

Captain BEDFORD PIM, R.N., M.P.: I think we shall all agree that Mr. Donald Currie's paper is one of such vast importance that it would be very wrong not to adjourn this discussion. I know of several gentlemen who would be glad to speak upon the matter, and therefore I beg to move that this discussion be adjourned.

Mr. CURRIE: I should be glad to say one word with reference to what has fallen from Sir Spencer Robinson, as it was not my intention, nor was it stated in my paper, that the merchant ships intended for cruisers should carry their armament in time of peace. What I meant was, that arrangements should be made in time by the Government, and that the armaments should be in readiness for all engaged steamers, both at the Colonial stations and in the Home dockyards.

The motion having been seconded, the meeting was adjourned to Thursday, the 11th of March.

Thursday, March 11, 1880.

THE MARQUIS OF LANSDOWNE in the Chair.

The CHAIRMAN: Ladies and Gentlemen, I have to invite you to a renewal of the discussion which began last week, on the subject of Mr. Donald Currie's paper. The adjournment was moved by Captain Bedford Pim, but before he proceeds to offer his remarks I believe Sir Spencer Robinson wishes to say a word on a matter of personal explanation only.

Admiral Sir SPENCER ROBINSON, K.C.B.: Before the proceedings commence, I wish to say just two words of personal explanation. Entirely through a mistake of mine I misrepresented something that Mr. Donald Currie had said at our last meeting. I beg leave to say that the fault was entirely my own, and did not lie the least in the world with the very lucid exposition which Mr. Donald Currie had given us.

Captain BEDFORD PIM, R.N., M.P.: With regard to my friend, if he will allow me to call him so, Mr. Donald Currie, I am sure no one in this meeting can entertain a higher respect for his enterprise and energy than I do, or a higher sense of the importance of the paper he has brought before us. It was my duty on Monday night in the House of Commons to draw attention especially to the true state of the

mercantile marine of this country, and to show that Mr. Currie's conclusions with regard to utilizing merchant ships in the event of war, except for the purpose of transport, or for laying out coals and bringing home our food supply, or for carrying mails, was in my humble judgment perfectly fallacious. One glance only at the plans and sections on the walls must convince any sailor that it is utterly impossible for a merchant ship ten times her beam for length, flying light, even to bear the top hamper of guns on her upper deck. If you were to attempt to run out a gun on the upper deck of a ship such as the "Hecla," and the other skilly-galee above it, flying light, only *one* of the guns proposed by Mr. Currie, in my humble judgment the vessel would capsize immediately. In bringing forward the subject on Monday night, I mentioned that before adopting Mr. Currie's proposal it would be the duty of the First Lord of the Admiralty to take one of these merchant steamers, flying light, into dock, and run out one gun to make the experiment, or the nation would "buy a pig in a poke." It seems ridiculous to think of carrying guns with such a midship section as is represented on the wall, but it would be the clear duty of the First Lord to *try* their stability before entering into the proposed arrangements for merchant steamers to do the work of the Navy. I have not the slightest doubt of the result; I have given great attention to the mercantile marine of the country; I served in it myself, and at the present moment I am Honorary Standing Counsel to what is left of the British seamen of this country, so that I know both ships and men pretty well, and I may be permitted, therefore, to give a slight sketch to you, my Lord, and to the meeting generally, of our mercantile marine. It consists in round numbers of some 25,000 ships, and it has a body of 200,000 or 230,000 men attached to it, of whom I am sorry to say 80 per cent. at least are foreigners. To my certain knowledge there are in the mercantile marine of Great Britain at this moment between 8,000 and 10,000 Russian Finns. Where would these men be, I ask, in the event of war with Russia? I merely mention this to show what the mercantile marine really is. We have absolutely no men to depend upon at all. I suppose there is no man in this room who has ever been to sea who does not know perfectly well that the foreigners in our merchant service, even supposing we could trust them (which is more than doubtful), would not stop for a single moment in the event of war. According to the return of Admiral Phillimore (than whom there is not a more competent Officer in Her Majesty's service), 12,000 men are all the British seamen that we have in the mercantile marine of this country, out of 230,000 men. The position of the country depending, as it does, on the mercantile marine, seems to me to be critical in the extreme, and I do not know what you are going to do to meet such an emergency as would arise in the event of war. Every seaman that you have in the Royal Naval Reserve—which I had the honour of starting twenty years ago in North Shields—is employed in the mercantile marine. You cannot take one man away from laying out your coals and bringing in your food. Everybody knows that we are no longer able to support ourselves in this country upon our own soil. We have at least two-thirds of our food brought to us from abroad. It is a serious matter, frightfully serious, you must all admit, both with regard to the men, and equally serious with regard to the ships. A good deal of this is owing to free trade. I said on Monday night, and I repeat it, I believe it has been the curse of the country. I love and respect Englishmen, and would do anything for them; but why should foreigners enjoy greater privileges in our land than ourselves? The condition, it seems to me, of the mercantile marine of this country is critical in the extreme, especially with regard to the men.

Here are a couple of models of two kinds of ship, one is nine times, only *nine* times, her beam length, and she has the same draught of water as the other, which is four times her beam length. In the case of the shorter ship, you can run out any number of guns, but I should like to know if any one would attempt to run out a gun upon the other. Most steamers are now ten times the length of their beam, and they are called magnificent steamers; but I say that you cannot run out one gun, let alone four or five, on the upper decks of vessels of that kind. It is marvellous to me that we go on building ships of this sort. These two ships are exactly the same tonnage, the cubic contents of each is 972. The length of the short vessel is 180 feet, and the beam 45; whereas the length of the other vessel is 270 feet, and the beam 30 feet. The all-round measure of one is 360 feet, and of the other 540 feet; so that there is

absolutely 30 per cent. more money required to make a long unseaworthy vessel. How shipowners can be so blind I cannot understand. The fact is these are not ships at all; they are built by the mile, and British seamen call them "gas pipes;" they are neither more nor less. It seems to me that such a state of things as this ought to be looked into with the very greatest care and attention. I for one desire to render to Mr. Donald Currie my warmest thanks for having had the courage of his convictions, and for coming down amongst this body of seamen to ventilate this subject; but I join issue with him entirely, and I say that if the Admiralty take even his ships—and I am told that they are the very best of the mercantile marine of the country—they will simply be cutting their own throats, and incurring a responsibility for which they will have to pay dearly. Why should we do so? I suppose Mr. Currie will hardly deny that a ship of this sort will cost the nation—assuming the same price is paid as was paid for the "Hecla"—70,000*l*. I suppose Mr. Currie would be sorry to part with one of his ships for a less sum than that? Now, for that sum we could build, and that within a few months, at least five, if not six, gunboats, any one of which would sink any merchant ship that ever swam. I have seen the "Algerine," commanded by my dear friend, the late Captain Charles Stewart Forbes, who was known to some Officers present as a most splendid and gallant fellow. I have seen, I say, the "Algerine" under his command at the foot of the Indian Ocean sailing round a Dutch East Indiaman, with topmast studding sails set. It is not only possible but easy to build a gunboat of such a nature as even to sail, to say nothing of steam, as fast as any ship afloat; it only requires a little skill. Instead of throwing nature overboard, as is too much the fashion, and taking to a spurious sort of science which all practical men despise, the plans which our forefathers taught us should be adopted in shipbuilding, giving us sections that we know how to deal with. The class of vessels which we have now seems to me perfectly dreadful. It may be said that to place a 38½-ton gun on board a gunboat of, say, 500 tons, would be at all events a little risky. Not that sailors care a snap of the fingers about a vessel being risky; but there is an Officer in the room who has invented a process by which he can obtain as much initial velocity from a 6½-ton gun as you can get from a 38½-ton gun. The plan is before the Admiralty at this moment. I have personally nothing to do with it beyond wishing the inventor good luck, but the inventor has done me the honour of showing me his plans and his proposal, and I believe they are perfectly sound. If that is the case, and if you can reduce the weight of the guns so much as this gentleman says, you can then, of course, resort at once to very small vessels which can be built for something like 9,000*l*. or 10,000*l*, and keep the sea, under sail, in all weathers, and manned with volunteer seamen would simply enable Old England to defy the world. I desire again to thank Mr. Currie most heartily for having brought the subject before us. I hope that it will be thoroughly threshed out by practical seamen, and that the country will not be allowed to go into an expenditure which in my opinion is absolutely useless, not to say wicked.

Colonel CLIXTON: After what we have heard from Captain Bedford Pim, it is hardly requisite that I should say more than a few words. With reference to the subject which has been brought so ably before the Institution by the lecturer, the principal inquiry to be made is, would not the smallest heavily armed screw steam gun-vessel, capable of carrying one heavy gun, be always able to master any and every merchant vessel, however large, which did not happen to be as heavily armoured and armed as itself? That is to say—unless while under the protection of war vessels, would any merchant vessel have a chance of being able to cope with such an apparently despicable foe, if it was not at least as heavily armoured and armed as the enemy by which it was attacked? If that be so, surely the question raised by the lecturer is at once set at rest for all time; the question, namely—whether the English nation could depend upon the mercantile navy as at all likely ever to be capable of successfully aiding us in our efforts either in the defence of their own ships or in the attack of hostile vessels? Consequently we seem to be driven to the conclusion that nothing can ever be satisfactorily effected towards securing and maintaining the peace of the seas, unless some arrangement could be entered into for that express purpose. Now, this is the age of great companies and of amalgamations with great companies. The Indian Government has been amalgamated with the Home

Government. Why should not the Mercantile Marine Service become national like the Royal Naval Service?

Colonel HOPE, V.C.: I desire to say a few words in consequence of the allusion made by Mr. Currie to the guns proposed to be placed on his ships, to which he applied the epithet "powerful." He mentioned that they were only 64-pounders, but he did not say which class of 64-pounders he contemplated. There are no fewer than seven different patterns of 64-pounder rifle-guns in the service now, varying from 58 cwt. to 5 tons; but even the best and the heaviest of these are not classified in the Ordnance sheet as "armour-piercing" guns at all, and consequently Mr. Currie's ships could not defend themselves against the smallest gunboat with a heavy gun which had any protection whatever. As Captain Bedford Pim mentioned, I have recently submitted to the War Office and the Admiralty an offer to construct guns for the use of the Navy of three kinds. The smallest is 6½ tons, guaranteed to beat the 33-ton gun in every particular, effecting a saving of 80 per cent. in weight, 60 per cent. in money, and from 90 to 95 per cent. in time of construction, or not to be paid for. The second is a 16-ton gun, guaranteed to beat the 80-ton gun in every particular, or not to be paid for. The third is a 23½-ton, guaranteed to equal an Armstrong 150-ton gun, or not to be paid for. That offer does not repose on my own calculations only, but on those of the only man alive who has ever sunk an ironclad ship with guns of his own manufacture—I allude to the well-known defender of Charleston, General Ripley. General Ripley was educated at the United States Military Academy at West Point, qualified for the Engineers, but chose the Artillery; was for a short time Assistant-Professor of Mathematics at West Point, was on the Staff of the American Army throughout the war in Mexico, and retired from the United States service in 1853 with the rank of Major. By command of the Governor of his State (South Carolina) General Ripley fired the first shot of the American Civil War, and took Fort Sumter. He afterwards defended Charleston for several years, during 585 days of which he was actually bombarded. By the aid chiefly of rifled guns of his own manufacture, improvised in a railway workshop, he repulsed the combined attacks of the Federal land and sea forces, and in particular that made on the 7th of April, 1863, by Admiral Dupont's ironclad fleet, consisting of the "Ironsides" frigate, the double-turretted monitor "Keokuk," and seven single-turretted monitors. The "Ironsides" was protected by 4½ inches of solid iron, and the "Keokuk" and the other seven monitors by 10 inches of iron built up. This attack he repulsed in two hours and twenty-five minutes, at ranges varying from 900 to 2,000 yards. As the result he sunk the "Keokuk," and put five of the other seven monitors, together with the flagship "Ironsides," *hors de combat*. I think that an offer from such a man as that, and from another who has, at all events, had the advantage of looking at a gun from both ends, is not unworthy of some consideration. If Mr. Currie will give me the weights of the guns which he has calculated for, I shall be happy to give him a calculation of the effect of guns of that weight made on my principle. I feel little doubt that I could give him an armour-piercing gun which would be able to pierce armour at a range exceeding the ultimate range of the 64-pounder he alludes to.

Admiral HOSKINS, C.B.: I had not the opportunity of hearing the lecture which Mr. Currie delivered the other day for the benefit of this Institution, but I have read it very carefully; and from the point of view in which I have had the advantage of studying the subject in Australia, I may perhaps be permitted to say a few words with respect to the employment of these large ocean steamers as men-of-war. When I was in Australia the question was constantly asked me by merchant ship-owners and freighters, first, "In the case of war being declared with Russia, what are you going to do for us?" and secondly, "What are the Government at home going to do?" To the second question I could only reply that I had not the slightest idea; but as to the first, after a great deal of thought, I was able to come to some clear understanding; and that was, that in case of war being declared, and it being known that the enemy's cruisers were likely to molest the commerce, it would be absolutely necessary to lay up all sailing ships in the first place. That was the only rational thing to do, speaking from an Australian point of view, and to employ these large ocean steamers, which are growing in number daily, and are monop-

lizing two-thirds of the traffic in the Atlantic. Of course trade would be very much restricted, and other inconveniences would follow, but the least loss would be likely to result from it. That view was warmly taken up, and I have been thanked for it on several public occasions. Then the question was asked, "Don't you intend to do anything to protect the steamers?" and I always answered, "I do not see any necessity for it except at the coaling stations, the touching points, and their immediate proximity. I believe that no vessel that any probable enemy of England could put to sea would be able to run those vessels down; and if they did, if they were lightly armed to protect themselves (a suggestion of which Sir Spencer Robinson approved last week) they would probably be able to keep off any of the vessels that the Russians were lately talking of preparing against us. I think the whole question almost resolves itself into a question of coaling depôts and docks, and protection for them. The depôts being fixed upon and fortified, our squadrons would be best employed in their neighbourhood, ready to protect them, and to see that the lines converging upon them, where the ships would be most likely to be intercepted, were kept clear."

Lieutenant CHARLES CAMPBELL, R.N. : In the paper that was read on Friday a great deal was said about coal depôts, but no mention was made of possible floating coal depôts. I should like to ask Mr. Currie if it would not be possible to utilize such ships as the "Great Eastern," or large vessels of very great carrying power for coaling the fleet, to attend upon them or meet them in certain latitudes, and would not the humbler class of merchantmen find ample work in carrying coal to the ships direct,¹ as was the case in the late operations in the Mediterranean, where they coaled the fleet alongside? Such vessels would run very little risk of capture. They have a speed of about 10 knots, and their contract might run that if the enemy should overtake them they should take to the boats and scuttle the ship, so that the enemy might not get the coal. With regard to the question of employing naval Officers in the merchant service the idea sounds very well, and we know that in the *Messageries Maritimes* the French employ Officers aboard their ships. It is all very well in peace time, when an Officer can say that he will be on half-pay long enough to make it worth while for merchant owners to employ him; but in such a war as was foreshadowed the other day we should require every Officer in the Government list, ay, and many that have retired as well, to man our own ships and conduct our own operations; and, as the Irishman said, "a man is not a bird, he cannot be in two places at once." With regard to the armament of ships, I agree with Mr. Currie. There is not one in a hundred of our merchant marine that comes up to the standard; but I think there are many vessels with a speed of 10 knots capable of carrying four guns of small calibre, say the 13-pounder gun lately tried at Shoeburyness, which sent an ogival-headed chilled projectile through a 5-inch armour-plate, and they might also carry the Nordenfolt and the Hotchkiss guns all round the deck. Mention was made of taking up transports abroad. We could not have a better opportunity of judging of the capacity of merchant vessels so employed than we had when the Indian troops were carried to Port Saïd and Malta and taken back to India. I was present with the Admiral at Port Saïd when he inspected those ships, and I venture to say finer vessels for the purpose could not be found under the flag of any other nation. With regard to the necessity of a scheme, I fully agree with every word that was said on Friday as to the importance of this question, and our best thanks are due to Mr. Currie for having brought it before us. But if we have a scheme it must be a practical one and be carried out at a minimum cost. We must remember that our Naval Estimates are 10,000,000*l.* already. With regard to the position of England, I believe that in the event of such a war as was foreshadowed on Friday we are as fully prepared as any nation can be in peace time for a great and lasting struggle. This is not a party policy; it was the policy of Rome, and it is the policy of Great Britain. Gibbon tells us that the terror of the Roman arms added weight and dignity to the moderation of the Emperors: they preserved peace by constantly preparing for war. They announced to the nations on the confines,

¹ Not necessarily for coaling at sea, but to give the Admiral the power of sending them in, under the lee of the land, or into the nearest available port, with a portion of the squadron to fill up.

that they were as little disposed to endure, as to offer an injury. Lord Palmerston told us at the close of a debate in the House of Commons, after the Indian Mutiny, that peace, however long it might continue, would not depend merely upon ourselves, but upon the conduct of other Powers, and you must be prepared by having a force sufficient at least to protect you in the outset from insult and attack. Depend upon it, for a country great and rich to leave itself without the means of defence, is not a method to preserve peace in the long run. It was said the other day that it would take three months for our mercantile marine to be ready to co-operate with the Royal Navy. I should like to know how long it would take any other nation to arrive at the stage we were in at the time when war was declared. It is also stated that foreign Governments are watching us with the greatest scrutiny and observing our minutest details; and I read the other day that the only people ignorant of our weakness are the Government, Parliament, and the British public. All I can say is that if we are in that awful position we had better wish with my countryman, Robert Burns,

"Oh! wad some power the giftie gie us
"To see oursels as ithers see us."

Captain LONG, R.N.: This is a question on which, as it goes to the heart of the nation, I think we must endeavour to get some light; and it is more especially interesting to naval Officers, being part of the science of naval strategy, if, indeed, we can call that a science which has neither professors nor text books. It is stated at page 24 of Mr. Donald Currie's paper, that nothing has been really done. Now, I happen to know, as an outsider, that a great deal has been really done; and I cannot refuse my humble tribute of admiration to a department of the public service which has, in a time of unexampled progress in the application of science to war, managed to gather the first fruits of every invention for the Navy and for the nation. The next point to which I wish to refer is that of our coal supply and our docks. There I go heartily with Mr. Currie. Our coal supply, as Captain Colomb has pointed out, is the very life-blood of a man-of-war in these days. Nelson, when he was in chase of the French fleet before the battle of the Nile, said: "If I were to die now, the 'want of frigates' would be written on my heart." I hope that no British admiral will ever have to say that the "want of coal" was written on his heart. There are two words at page 16 which seem to contain the whole gist of the matter—"Admiralty requirements." What are Admiralty requirements? The protection of the trade of this country. What is the trade of this country? 20,400 sailing vessels and 4,800 steamers. Now, of those steamers, 148 range from 2,900 to 5,250 tons gross register. What is the speed at which that trade is carried? I think we may divide our steamers into three classes, and perhaps there is a fourth, as the ruck. The first class, such as the "Germanic," the "Gallia," and the "Orient," have an average speed of 14 knots on voyages, and on favourable occasions as high a speed as 17 knots. The second class of vessels, such as those composing the Royal Mail Packet Company's service, the Peninsular and Oriental Company, and the like, average from 11 to 12 knots on a through voyage. The third class average about 10 knots, certainly not more than 11. Then as to the distance that these vessels have to go without coaling. Captain Colomb tells us, after the most complete investigation, that 3,500 miles is the distance which a ship must be prepared to go without coaling. I have no hesitation in saying that a ship ought to be able to go that distance at a speed of 10 knots. Now, how are we to protect this great commerce? Here we must fall back upon the lessons of history. By blockade and convoy. Now suppose we have to convoy a number of vessels, how are we to do it? It might be necessary to convoy the slower ones. Now, in my professional experience there are two things which I have witnessed bearing upon this question. The first was the passage across the Black Sea in the year 1854 of a flotilla in company with the allied fleet. That was a short distance. I do not know the exact number of the vessels, but I know that the Cossack who reported their advent in Sebastopol said that there were so many he could not count them. The second is the cruise of the first flying squadron under Admiral Hornby, and on two occasions that squadron traversed 3,000 miles under sail (six ships in company) at an average speed of 9 knots. I think those two facts go to prove that there would be no difficulty what-

ever in conveying the food and provisions required for this country at a speed of 11 knots across the ocean. The next question is, what number of vessels would be required for such a purpose. This is a matter which of course it is impossible to arrive at an accurate conclusion upon, but I find that if we go back to the year 1797, when cash payments were suspended, and the funds were at 51, and the fleet was in mutiny, the Naval Estimates were 13,000,000*l.* odd. There were then 108 sail of the line in commission, and 153 cruizers commanded by Post Captains. Now what was the trade which we then had to protect? I find that there were (with the nearest approach to accuracy that I can get) 1,100,000 tons of shipping cleared outwards from this country in the year 1797. In 1878 there were upwards of 50,000,000 tons of shipping cleared from this country. Then comes the question, have we vessels enough in the Navy which are competent to protect this trade? I need hardly go into that question, for the highest authority, the First Lord of the Admiralty, says that we have not got vessels enough under some contingencies. As far as I am aware, we have nine vessels capable of conveying what I have described as the second class, and two vessels which may convoy those of the first class, and perhaps thirty, which, if they had coal enough (which I doubt), might be capable of conveying the third class. Then we come to the capacity of our merchant shipping for self-protection. I will not go into details as to naval architecture. This country possesses some of the first naval architects in the world. But I think it is quite clear that the Navy at present is insufficient to protect all this great trade; and as I do not think anybody can see a reasonable prospect of our having a Navy large enough for the purpose, it behoves us to turn our eyes seriously to this question, and to see that these subsidies which we give for mail service are not given without due regard being paid to the subject. With regard to the capacity of these ships to defend themselves, there is no doubt that such a merchant ship as the "*Germanic*," if she can carry guns enough in the way described, would be a formidable antagonist. If three of these vessels were to sail together from Liverpool, I should like to see the Russian cruiser that would touch them. They would have to attack them with more than one. Three such vessels in company having good rams, and having their engines protected and a few guns, would be very formidable in the hands of our splendid merchant seamen. I agree with Mr. Currie that such vessels would be quite as valuable for war purposes as a vessel like the "*Shah*." One other question remains to be noticed. We cannot, I think, help noting the coincidence that a distinguished Naval Officer and a shipowner eminent for his patriotism, should have come before the country at this juncture to point out the insufficiency of our forces. This indicates a want of confidence where it should most surely be found. How is that want of confidence to be avoided for the future? We have at the present moment a Royal Commission sitting to consider the question of our colonial defences. Now I venture to think that there should be a strengthening of the professional element on the Board of Admiralty by the association of a Strategical Council, composed of ex-Commanders-in-Chief of foreign stations, a Royal Engineer of eminence, and perhaps an Officer of the Marine Department of the Board of Trade. And if this Council were to present a report annually to the First Lord before the framing of the Estimates, as to the bearings on strategy and tactics of the latest application of science to war, the country would then know that the best informed and most practical minds were directing their attention to those important subjects, free from the trammels of administrative business.

LORD ALFRED CHURCHILL: I feel great diffidence in speaking upon this question before such an audience, and I do not know that I should have attempted it had it not been my fortune very recently to have inspected the ideal ship that has been referred to. A Committee of the Society of Arts asked Mr. Donald Currie to allow them to inspect his latest ship, which he did. We saw it under the most favourable circumstances, and I may mention that I was accompanied by Admiral Nolloth and Captain Toynbee. The ship was entirely empty, and we went over her right down to her keelson, and into every compartment. There is an illustration on the wall of the various compartments into which the vessel is divided. It will be observed that there are certain horizontal and perpendicular compartments. Each of those represents an entire space. If it were filled with water, the water could not get into another. There are twenty-two of those compartments in all. Not only are

the upright ones of iron, but also the longitudinal ones; and the decks themselves although covered with wood, are of iron, therefore if the water went into one compartment, it is impossible that it should get into another. That has been practically tested. On a recent occasion one of these ships, the "Windsor Castle," caught fire in one of the compartments, and it was extinguished without communicating with any other. The same ship subsequently came to grief near the Cape of Good Hope and running ashore she held together by her immense strength for two or three days while the cargo and passengers were saved, although the vessel was eventually lost. I merely mention that to show the strength with which the vessel was constructed. In addition to that she has three or four compartments between her keelson and false deck, capable of holding water and ballast, or of being pumped out and filled with air. I think this appears to be, as far as we can see at present, the most perfect type of cruiser that we can imagine. I may also mention that she can steam from England to the Cape of Good Hope and back again without recoaling, at the rate of 11 knots an hour. I think that at any rate will satisfy the last speaker as to the capability of the vessel in keeping at sea. I asked Mr. Currie—"Supposing she was not laden with cargo and sailing for a long cruise, how long she could keep at sea?" and I believe his answer was (he will correct me if I am wrong) "at least fifty days steaming at 12 knots an hour." But since then, I am told she could, if used solely as a cruiser, carry 3,500 tons of coal, which at a consumption of 40 tons per day would give eighty-seven days' steaming. The question of armed merchant ships divides itself into two classes. There is the cruiser which is capable of acting efficiently for offensive purposes as a man-of-war taken up by the Government, and there is the cruiser which, being armed, carries on her legitimate commerce. I wish there were more of these vessels than we have at present adapted for these purposes. With regard to their guns, my impression is that ten are too many, and two swivel guns perhaps will be more efficient, but that is a minor point. It may be necessary to remove a few deck houses, but that also is a matter of detail. The question is whether such a vessel is capable of acting efficiently as a cruiser; and I believe she is. I think we are all deeply indebted to Mr. Currie for having raised this question. There are few shipowners who have exhibited so much patriotism as he has. He has the heart and soul of a patriot, and he has the means of putting his ideas into execution, and illustrating what can be done in this direction. Sir William Hall, who spoke at the opening of the debate, was reminding us of the wonderful heroism and deeds of glory which were performed by our Navy in former years; and these deeds, he said, were done when the population of the country was only 13,000,000. Well, no doubt, those were glorious deeds, but we have progressed since then; and I may remind our friends, Admiral Hall and Captain Pim (who objects to free trade), that our population has doubled since those days, and we are now under very different circumstances. The country no longer gives us all the food that is necessary, and we must therefore seek it abroad. Our very existence as a nation depends upon our being able to get not only ample supplies of food, but also that raw produce from which we manufacture those articles, which are necessary to the civilization of mankind. Sir Spencer Robinson, in an able article in the *Nineteenth Century*, informs us that our Navy, powerful as it is, is not sufficient, in his opinion, to resist a combined attack. It may be sufficient to defeat any one or two Powers, but if we have a combination of all the Powers against us, he does not think that we are sufficiently strong. Now, what is the best mode of meeting that? I think the best mode and the cheapest in the end is to adopt the principle laid down by Mr. Donald Currie, and by Mr. Burns, who has written an able letter on the subject in the *Times* of this morning, to arm our merchant ships, and to enable them to adapt themselves as cruisers, in the event of war. Those cruisers might either be taken up for offensive purposes by the Government, or they might carry on legitimate commerce as armed cruisers. I do not believe that the Treaty of Paris, which we have heard so much of, would in the event of war be anything more than waste paper. I do not say that England would be the first to break it, but other nations would break it; and if we are attacked, and if our commerce is attacked by those who break the Treaty and put privateers in operation, we shall be absolutely compelled in self-defence to do the same. It is therefore most essential that we should be prepared beforehand to meet any attack from whatever sources it may come. I think that

the question which is now before us is one which, now that it has been so ably opened by Mr. Currie, will deserve the serious consideration of this country.

Commander GILMORE, R.N. : I think this subject is one of the greatest importance, not only to the Navy, but to the country generally—the question is whether we ought to keep a sufficient quantity of men-of-war to protect our commerce, or to subsidize merchant vessels for that purpose? In olden times they believed in what were called frigate-built ships—ships built by owners who, on condition of building vessels capable of carrying broadside guns, received some support from the Government. Such arrangements do not now exist. The commerce we have to protect amounts to the enormous sum of 800,000,000*l.* sterling; that being the amount of property passing to and fro in English vessels between England, the Colonies, and foreign countries. Then the question arises as to the conversion of these vessels, whether it would not be more expensive to convert them than it would be to keep a sufficient number of fast cruisers on the list of the Navy. Speaking broadly, I think that to take one of these merchant vessels and to make it a sort of man-of-war would not cost less than 20,000*l.* You would have to take away the passenger accommodation to strengthen the decks; and not only that, but to strengthen the vessel from keelson upwards. Then the question is, as Captain Pim says, are these vessels, from their extreme length, capable of carrying heavy guns on the broadside? I should say, certainly not. Then another thing is, these vessels will have to stand end-on fire. A shot from a 38-ton gun would go through both sides, and if a shell were to burst in the coal bunker it would smash everything around it. Then there is the question of coaling depôts. Ship B is, I suppose, a *rara avis* (there is none other like it in the world) steaming 12 knots for fifty days' running. Captain Colomb says that it is necessary to go 3,000 miles without coaling. Now there are very few of our men-of-war that can steam 3,000 miles. Some of our very fast vessels can only carry coal for three days, going perhaps 1,000 miles. When we gave up Vido some years ago to Greece, we in fact gave away half-a-dozen ironclads; we did away with our principal coaling station in the Mediterranean, and there are very few places in the Atlantic where you can get coal. There is Madeira, where the stay is very short, and you are obliged to be off at a moment's notice. The weather is often heavy that you cannot coal, except in very small quantities. At St. Helena the coaling is difficult, and also at Ascension. As to the "Great Eastern" carrying coals to coal the fleet at sea, any sailor might see the absurdity of it. How can you coal vessels, except by single bags, at a time when they are rolling heavily in the trough of the sea? I think that this question ought to be thoroughly threshed out. It must not be supposed that this is the only plan which can be adopted for the protection of merchant commerce, but a number of cruisers might be a part of our permanent force, forming, as I believe they would, a very valuable auxiliary to the Navy.

Commander CURTIS : I concur with all the other speakers in thanking Mr. Donald Currie for bringing this all-important question before us. It leads over a very large subject, and it suggests the question whether it is necessary for this country to have an *efficient* Imperial Naval Insurance to keep inviolate the commerce and dependencies of Great Britain. Mr. Donald Currie has told us that merchants were called upon by the Admiralty to send in a list of certain ships with a view to see whether those ships were able to meet certain ships that might be opposed to them. The shipowners asked for a subsidy, and I rather think Mr. Currie states that the merchants felt themselves somewhat aggrieved, inasmuch as they had not received compensation for any money they might have laid out. If that is the case, I for my part think it is only due to the merchants that they should be reimbursed for any extra expense that they have incurred in order to meet the views of the Government. But supposing such ships should prove not to be suitable some little time hence, and the Admiralty were to construct a class of ships suitable to protect our commerce, to be able to steam 5,000 miles at 10 knots an hour, and if necessary to put on a spurt of 13 knots, it would not do to build such ships with a length ten times their beam, for a vessel of such proportions cannot manœuvre. These ships for the time being are supposed to meet other ships, and the class of ship best suited for the purpose would be a ship having a steel movable belt which could be shipped or unshipped, also a ram that could be shipped, and fore rudder, according as the vessel

is required for commerce or for war.¹ By means of such armour she could be made shot proof. I would have the ships always armed with two guns and one rotary gun, so that the men could be exercised on their peace voyages. The Admiralty employing these vessels, by so doing would have efficient Officers and men when an emergency occurred. According to Whittaker, the imperial wealth of this country,² imports and exports, is 932,800,000*l.*, and the naval expenditure is 10,500,000*l.*³ what is that? A little over one per cent. on the commerce⁴ that has to be protected in its transit across the water.

Admiral LETHBRIDGE: We have to thank Mr. Donald Currie for his very able paper, which I consider one of very great importance to this Empire. If war breaks out, no doubt the first thing will be the destruction of the Suez Canal. You might have an ironclad at either end, but gold would blow the banks in, and therefore we must not look for a passage that way. We shall then have to rely upon the passage round the Cape of Good Hope. I would ask, in the event of war, whether it would not be advisable to have a flotilla ready to go forth from the Cape to guard our commerce as it comes along. That touches upon the coal question, and it also touches upon the dock question. At Simon's Bay, which is our naval arsenal at the Cape, what have we in the shape of docks? We have nothing. We have a patent slip capable of hauling up a vessel of 1,000 tons, but nothing more. The fortifications are mostly unfinished. The fort on the north side is complete, and mounts 38-ton guns. The other on the south side is incomplete, and is intended to mount 38-ton guns. Officers who have been there fully understand the position of the Roman Rock. That is a position which could be well fortified to defend our dockyard against vessels in the bay. It could be destroyed by electricity should it fall into the enemy's hands. Just inside Noah's Ark on the mainland, a new battery is being constructed to mount 38-ton guns. Opposite the hospital there is a depth of water 18 feet at dead low-water; with a rise of 5 feet spring tides it would be very easy to construct a dock there for taking in the ships which are to guard our commerce. Ships will get foul, and require docking every four, five, or six months; therefore it is necessary to construct docks to enable them to keep the sea, for, as everyone knows, directly the bottoms of ships get foul, away goes the speed. As regards another station for coal, I should suggest Sierra Leone. At Sierra Leone you run some four or five miles up the river before you come to the town, and in that town there is a very large coal store capable of holding several thousand tons of coal; the harbour is narrow, and, therefore, can be easily defended; therefore this is another point from which we could send our cruisers forth to see our commerce safely across the ocean. On the opposite side there is Barbadoes, with ample coal accommodation, and well defended, and ships from there would see our commerce safely across the Doldrums. Three years ago, on the 2nd March, 1877, Mr. Robinson, a member of the Legislative Council of Natal, stated in this room that there was coal 180 miles from the coast—"coal of the very best steam quality." I ask what has been done towards bringing that coal to the coast? I believe up to the present time nothing has been done. This is a subject of great importance. Another point is our telegraph communication. I suggest it should be by the sea, as the present line of communication could be cut one hundred times a day. The telegraph should be laid from the Cape *via* St. Helena, Ascension, a branch to Sierra Leone, and home; let us be independent of other people, and not lay our wires where they may be severed. I now come to the very important question of mercantile ships for war purposes. Mr. Donald Currie described the ship *A* with iron decks covered with wood. The frames 2 feet apart. These decks are fully capable of bearing any strain you choose to put on

¹ Are merchants prepared to build such vessels? I see by the *Standard* from one-fifth to one-fourth of steamers built yearly are lost every year. So merchants will have an opportunity. Would it pay the merchants to hire these vessels in peace? If not, I say let the Admiralty use them as transports and man them.

² The Colonies to contribute their quota, say in proportion to their exports and imports, and to have their *share* of naval patronage.

³ It may not be generally known that the Excise duties exceed by 3,000,000*l.* the Army and Navy expenditure.

⁴ He is no *true patriot* who would starve the efficiency of either service.

them. As regards armament, Captain Pim tells us that ship A will capsize. Why? She is 43 feet beam, and to imagine that with ten 64-pounder guns of 64 cwt. such a ship will capsize is, in my opinion, an impossibility. If she is a vessel to protect our commerce she would not carry cargo, but coal; and, therefore, that would give her stability. The water ballast in her bottom would also give stability. I do not quite approve of the way in which Mr. Donald Currie mounts his guns; he has the guns on truck carriages. The 64-pounder gun should not be mounted on a truck-carriage, but on a slide and carriage—a form of mounting which gives the gun crews great confidence in their guns; but if you place that gun mounted on a truck-carriage with a slippery deck, and the ship in motion, the gun will turn round and look you in the face, and, after a few rounds, she will begin to dance. I should like to say one word to shipowners on the subject. I quite agree that shipowners should receive some support from the Admiralty. They should from time to time be informed as to what the Admiralty requirements are, and should carry them out. The pivoting gear and breeching shackles should be actually built when the ship is built, and if the ship is thus prepared, it will not be a question of three months or three weeks, but within seven days that ship could be fitted out with her armament, and be on the high seas doing her duty. As regards such ships being attached to a squadron, I think Admirals would be very glad indeed to have vessels attached to them with the 1,400 or 1,600 tons of coal that ship A can carry, and she can carry more if coal is placed where cargo is now stowed. I am sure an Admiral would give the top of his little finger for two or three such ships which could perform their 12 or 13 knots at an expenditure of 40 tons of coal per day. Then with regard to look-out ships: my father was in the "Unity" in 1805, a frigate which was stationed for nine months off Brest; she had to go in every morning to count the French ships, and see that none had escaped during the night. Long Tom was brought to bear upon them, and now and then a shot came whizzing between the masts. An Admiral would be very glad to have such vessels as ship A for that purpose. It is very important that such vessels should have large coal stowage to perform the many duties of look-out ships, a duty which they would be able to perform equally well at night, as by the aid of the electric light they could communicate with the Admiral at a distance of 8 or 9 miles, and give him timely warning of ships being sighted.

Major FRASER, R.E.: A remark was made just now that might mislead the public with regard to some of the small guns in the Navy. I understood Colonel Hope to say that none of the service 64-pounder guns will pierce armour at all. That is not exactly the case. The 64-pounder wrought-iron gun is now provided with a Palliser shell, which will certainly penetrate 4 or 5 inches of wrought iron at short ranges. I do not pretend to enter into the naval aspect of the subject, but in discussing the question, the 6-inch B.L.R. gun of 4 tons should be considered as being the gun of the present. This gun at short ranges will penetrate 10 inches of iron. Small gunboats with more than 10 inches of iron plating are, I am told, rare, and should thicker armour become usual in this class, a moderate increase of weight in the guns to be used will probably meet the increase. I was delighted to hear the prospect that Colonel Hope holds out with regard to guns. I trust he will succeed, and after he has done so, I hope he will also provide for the infantry as good a weapon in its degree as he promises to the artillery.

Sir HENRY BARKLY, G.C.M.G., K.C.B.: As a member of the Royal Commission, appointed to inquire and report as to the best means of protecting our Colonies and our maritime commerce, I do not like to remain silent on this occasion, although, as the Commission is still engaged in taking evidence, and is not likely to arrive at any conclusion for some time to come, I need hardly say that I am not in a position to take part in this discussion. Sir Henry Holland and myself, however, attended here with the sanction of the Commission for the purpose of hearing Mr. Donald Currie's lecture the other day, and listening to the discussion to which it has given rise, and I now rise for the purpose of saying that the Commission are fully convinced of the great importance of the suggestions that have been made as to the necessity of arming some of our first-class steamers to co-operate with our Navy in the event of war, and they feel deeply indebted to Mr. Donald Currie for having taken so opportune a moment to raise the question, and to elicit the opinions to which we have listened.

Admiral SELWYN: I am going to take a somewhat broader ground than anything we have heard this afternoon. I desire that Mr. Donald Currie, who has come to consult us as professionals, should receive a professional answer; and I think any professional answer ought to be given on a broad statement of the facts of the case. At sea, as a question of history, there are two games which may be played; one is that of the lion, and the other is that of any of the long-eared animals who trust to their heels. Our merchant steamers are eminently qualified to play the part of running away, and it is their business to do so. We must not mistake the question, and think that because shipowners are very patriotic, and are willing to undertake any trouble and expense that may help the country in case of difficulty, that therefore we should be satisfied to have what must at least be only comparative efficiency instead of perfect efficiency. If the "Iris" were put against any one of these boasted vessels—and we must consider that a vessel similar to the "Iris" might be in an enemy's hands—there is no difficulty in any foreign Power getting an "Iris" built in this country, and even if in this country there were difficulties in their way, they might go across the water, and find many speculators ready to build. I say if the "Iris" were put against these ships, she could take as many of them as she could catch, and if they had 64-pounder guns, having found their heels insufficient, and having attempted to play the part of the lion, without the lion's skin, they would find themselves in the position of being clean shot through and through, from stem to stern, or *vice versa*, and sunk directly they dared to fire. In the ordinary case a vessel of war meeting a vessel such as this at sea would say, "She is an inoffensive merchant ship; we won't do her any harm, but she must submit;" but should she fire a gun, that instant she invites attack, and no consideration of humanity will prevent her being sunk directly, then and there. You have to consider what you are doing when you adopt such an idea as this. You are putting on the lion's skin without the lion's power. There is a much wider question as to how we are to provide the very wheat which it is acknowledged we should want during war without these merchant steamers. Do you imagine that a convoyed fleet of such steamers could go across the Atlantic at 11 and 12 knots an hour without ensuring competition from neutrals immediately? Could you afford to go across slowly? Would any shipper of wheat or grain on the other side of the Atlantic prefer an English vessel going 12 knots to a German vessel going 15? The real, the great danger is this: that in the present state of maritime warfare, one cruiser at sea like the "Alabama" creates such a scare as long as she is not caught—and no number of cruisers could ever absolutely ensure her being captured—she would create such a scare that commerce deserts your flag altogether. The United States' commerce was equal to our own, and it collapsed and disappeared in two years of inefficient war; it came to us, and commerce once so transferring its allegiance never goes back. This is the real danger against which you have to guard; and it is not by any volunteering, however good, that you can meet such a danger. You must be known not only to have the ships which can control the ocean, but also those which will prevent fleets from ever coming out, which will at the very incipient building of a steamer for such a purpose, watch the port in which she is to such an extent that she shall be captured when she comes out. True, it is a very difficult operation. A dark night or a heavy fog puts all our best precautions entirely at fault, and we cannot prevent a steamer going out whenever it chooses. With wind and tide and sailing vessels we should have known how to do it exactly, but not so now with steam. I say distinctly, a merchant steamer owner will do best if he simply follows the path he is now pursuing—make the coal supply as efficient as possible, get as high a speed as possible with as low an expenditure of coal as possible. I speak more confidently on that part of the subject because I have a letter in my hand from a vessel which has gone for ten days on 1 lb. of coal expenditure per indicated horse power per hour. Let our shipowners, then, go forward in the elaboration of the best ships for commercial purposes. If, when war is declared, Government find that they cannot in any other way get as good ships, it will serve their purpose to buy at the time and on the spot that which they can fit for their own purposes; but I doubt very much whether that will replace such ships as we ought to be building for the Navy. The employment of naval Officers is a question to which attention is very

wisely drawn, but again I question very much whether it can be solved by employing old naval Officers, or by their amalgamation in any way with the mercantile marine. I think, on the contrary, the First Lord's speech in Parliament the other day shows distinctly what the evil is and how it is to be met. We have opened wide the door during the past twenty years for young Officers into the Navy, until all promotion in the Navy is stagnated, and we are now going to shut it again, and admit only fifty-five naval cadets per annum. What supply of naval cadets will that give you if you have occasion for a large fleet? Nothing at all. By the French plan, every young boy whose parents intend him to go to sea, is first sent into the Navy for four years to learn the discipline, and, having had the advantage of good schooling and good companionship, he then goes at the age of sixteen to the mercantile marine with the associations which he has learned in the Navy, both of discipline and gunnery, and many other things which will help him, should he ever be required to go back to the Navy. By that means they have a reserve for the Navy of Officers of all classes, and also ensure the more perfect education of the mercantile marine; the two things will be co-incident. In this paper we have a proposition in fact exactly equivalent to that of "Volunteers v. The Army." If it were the fact that our country was willing to accept our volunteer service as merely auxiliary to the professional service, we should be able to go on admirably well; but unfortunately people are always pressing for a reduction of the fully-equipped professional, in order to bring forward the half-equipped volunteer, and that is always the tendency of that beautiful pruning of the Estimates which yearly takes place in the government of the country, always substituting something that is not the real thing, because it is a little cheaper at present, whatever it may be in future. I think that no such principle should be applied to our Navy, and I should be very sorry, knowing how much depends on thorough efficiency, on being up to the latest requirements of the Navy itself, if any such thing were to be done. I am sure that Mr. Donald Currie will join with me in saying, we shall be very sorry to see any such feeling going abroad. The probabilities of progress are such that we should be very unwise to ignore them. What we want is the last development of science, and that which it can give us at the time when it is to be put in operation. As for conveying, as a gallant Officer near me remarks, that is as extinct as the dodo, the whole system has been exploded by the use of steam. You might just as well set the old stage-coach to convey a railway train, and expect that people would go by that train. I am sure we wish Mr. Donald Currie every success in the right direction of his efforts, which is a consideration of what can be done in employing the mercantile marine as part and parcel of the defences of the country, but I must join issue with any proposition that goes an inch beyond; and I say every one of us ought to press forward, to the utmost of our power, that kind of constant experimental research which results in steady progress, never throwing back any suggestion because it is too new. I have lived to see a great many suggestions, which were at one time so criticised, and which yet have brought out great results. One of those suggestions, the Perkins engine and boiler, three years ago was the subject of a report to the Admiralty by a Committee appointed by the House of Commons, and yet the experiment has never been officially tried, and it is left to the private efforts of men who have at heart the development of progress, for other reasons, to bring the matter forward? Should that be the case? Is a Committee appointed for nothing? Ought we to have at this day steam engines on board our ships which use more than two pounds of coal when we might have them using one pound? Ought we to have boilers that blow up, when we might have boilers that won't blow up? Ought we to have boilers that wear out, when we might have boilers which would be practically everlasting? This is distinctly due to the utter abhorrence with which everybody who introduces a novel idea is viewed in the departments of this country, because he is regarded as a disturber of the public peace. This is the real evil which should be conquered, and if such a Council be established, as was foreshadowed by one of the previous speakers, it ought to be allowed to entertain, inspect, and review, as we do here, to a certain extent, every project brought forward, in order to sift out the good and to refuse the bad. This has not been done yet, and it will only be done by the proper union of mechanical, engineering, and professional talent of whatever kind; and so long as we believe in a certain set of gentlemen, who come and tell us, "We have

"not done the best, it is true, but we have done as well as we knew how; and we are satisfied with that;" we shall have ships which are not safe; for as Captain Sadder, the Commodore so-called of the State line of steamships, said the other night, "If they are light they heel over with the slightest breeze;" and so long as you choose to put a board set on edge in the water they will not be safe, and will certainly not carry heavy guns on the broadside. Under certain conditions, if you choose to go very fast at sea in smooth water, that is the best way to do it; but if you are to make a ship that is to encounter all weathers without damage and without loss, for God's sake do not build such things as you do now.

The CHAIRMAN: General Stephenson and Gentlemen,—I can assure you when I accepted the suggestion made to me, that I should fill the chair upon the present occasion, it was not with any idea of offering to such an audience as that which I see in this theatre any remarks of my own upon a very technical and difficult subject. At the same time I hardly like to let this interesting discussion close without assuring you in a few simple words how much its importance has impressed itself upon my mind. I think Mr. Donald Currie is very much to be congratulated upon the reception of his paper, the more so because it has been nearly a week before the public, and the members have therefore had ample time to pick out any flaws or weak points which his scheme might present. I was struck by the observations of the gallant Admiral who addressed us very eloquently on the former occasion, and who dwelt with great animation upon the disastrous results to the Navy of party government. Well, I am not going to enter into party politics, particularly at a moment when the political atmosphere is so bracing and invigorating as it is now; but I am bound to say that, in my humble opinion, it is not so much party feeling from which these questions suffer as from the apathy and indifference of a large section of the English public. All of us are brought up to believe that "Britannia is to rule the waves," but having accepted that proposition, we are very much inclined to remain content with a vague idea that Britannia lives somewhere near Whitehall, and the best thing to be done is to leave her to rule the waves after her own fashion. The great advantage of these discussions seems to me to be that it brings forward in a very practical light the different points by which these issues are affected. I think nobody can have attended either this debate or have read the literature on the subject of late without a slight feeling of uneasiness with regard to our maritime position, whether we think of the enormous extent of our dependencies, covering as they do somewhere between 7,000,000 and 8,000,000 square miles, or whether we think of the extent of our trade, and above all things upon the immense proportion of that trade which concerns the food supply of this country, a proportion which increases year by year, for in the last twenty years the amount of corn and grain imported into this country has more than doubled, and there is every indication that that progress will continue. Under these circumstances may we not view anxiously the position of a country which, like ours, depends to such an extent upon a foreign food supply? Now, besides that, we have to consider our responsibilities. It is difficult to discuss that question without getting upon politics, but our responsibilities do not appear to me to be diminishing at all, and we have been told on very high authority indeed within the last few hours, that the voice of England is to have an ascendancy in the councils of Europe. If that is to be the case we must take care that we are fit to maintain the position which is thus assigned to us. With regard to the resources of our Fleet, I am certainly not going to enter upon a disquisition on that subject, but I think it is evident even to a civilian that there are one or two points of weakness in our position. One of those is the comparatively small number of cruising vessels which we have at this present moment; another is, of course, the fact that these costly ironclad men-of-war are liable, like any other complicated machines, to get out of order, and that when they do get out of order they may remain, for want of graving docks, for want of facilities for repairing damage, in a state of helplessness a great many thousand miles away from home. Well, that is a very serious consideration. Then, when we turn to the case of other Powers, what do we find? I hope that our absolute maritime superiority remains unchallenged, but our relative maritime superiority certainly has diminished, unless I misunderstand the figures which have been quoted within the last few years, so that I say we are bound at all events, whatever our own leanings may be, to consider very

attentively such a scheme as that which Mr. Donald Currie has placed before us. In order that that scheme, or any scheme of the kind may be carried out, you require, I understand, two conditions. One of them is that the Government upon its side should take properly preconceived measures; the other that shipowners on their side should be ready to facilitate the action of the Government. Now as to the measures which might be taken on the part of the Government, there is, I understand, a disposition upon the part of the Admiralty to admit in principle the necessity of depending to a certain extent upon the merchant service. That was stated the other evening in Parliament, and if there is a difference between the responsible chiefs of the Admiralty and my friend on my left (Mr. Currie), it is that they would propose to defer till the actual outbreak of hostilities those steps which he (I must say I think with considerable reason on his side) should wish to see taken, not at the actual time of the emergency, but before it had actually overtaken us. I understand that before a vessel can be available for such purposes as those contemplated by Mr. Donald Currie, her decks must be of a certain strength, she must have certain coal-carrying capacity, and that there must be bulkheads which will divide her into compartments. If we wait until the outbreak of war, and then turn round and endeavour to procure such vessels at the last moment, I am almost inclined to fear that before they were fitted out, we might find that our commerce had received a blow of a very disastrous nature. With regard to the principal points touched upon by Mr. Donald Currie, there is only one as to which I would venture to say a word. It did occur to me that one or two of the speakers who addressed us seemed to suppose that he contemplated that these merchant steamers, armed as he proposed, should successfully resist men-of-war or gunboats belonging to hostile Powers. Now I understood from him when I listened to his paper, that he contemplated rather that they should be capable of resisting not vessels of that kind, but vessels of the same class as themselves, which were likely to be equipped by a hostile Power very much for the same purpose that he has described. There is another important question which has been touched upon, and which seems to me to be a very serious one, which is the question of men and Officers, and there is no doubt Mr. Donald Currie in his reply will explain that point perhaps a little more fully, because there does seem to be rather a difficulty in seeing where the necessary number of Officers and men are to come from to supply these vessels. I do not like to detain you longer. I would only echo the feeling which has been expressed so well by several speakers who have addressed you, the feeling that Mr. Currie as a leading shipowner has set an admirable example in coming forward in connection with this question. He mentioned to us in his paper the case of Russia, and he described the steps which were taken by the Russian Government to induce the good people of Moscow to find the sinews of war for a project of this kind. We may be quite sure if ever the occasion arises it will not be necessary to apply such pressure to the great shipowners of this country, but that they will come forward cheerfully, cordially, as he has done, and do their best to assist the country in its hour of trial.

MR. DONALD CURRIE: My Lords and Gentlemen, I feel very grateful for the kind expressions which have been used with regard to this paper and for the patience and consideration which you have shown to me. I had taken the best means of obtaining information. I am not acquainted with the use of artillery, nor am I a sailor nor a strategist; I am simply a shipowner, and one observing the current of political affairs abroad and at home, and willing to assist in some measure with suggestions directed to the security of the country.

I can assure Captain Pim that in taking the steamship A, I have not drawn an imaginary vessel. She is a typical steamer now in existence, the name of which has not been mentioned in this theatre. She is not ten times but eight and a half times her beam. In my paper I stated distinctly that there were a good many steamers in the mercantile marine, with equally low consumption of fuel, able to steam 12 to 14 knots, but which would not be available when required; and I suggested they were not all worth having as fighting ships. There are vessels which have a want of stability, but ship A is sufficiently stable. As regards the number of men, I earnestly sought in my paper, but as briefly as possible, to urge upon you all how necessary it was to have ready for emergencies an adequate supply of seamen, and I am of opinion that we are anything but supplied for a sudden emergency. These ships

will have a value, apart from their fighting qualities, if prepared in time, in respect of the men who will be engaged by the shipowners; and as to expense, I venture to say it would cost the country next to nothing. As regards a money payment to the shipowner, I think that an arrangement might be made for picked ships. I do not speak of my own vessels, I refer to the best steamers which may be obtainable. Twenty of these vessels might be held ready during peace; it would not cost much more in wear and tear, interest, and depreciation, than the expense of keeping up one or two ironclads or a couple of cruisers, such as you have in the Navy. Reference has been made to what a one-gun gunboat can do; but what about her coal carrying power? I am quite aware a cruising steamship with a large gun may be as powerful as another steamer with a greater number of light guns. I do not disparage such vessels. Many of the steamers of the B class might be fitted to carry one or two guns of good penetrating power.

Colonel Hoop spoke of the 61-pounder in ship A. I can assure him I did not manufacture the plan either for the use of 61-pounders or the carriages which Admiral Lethbridge speaks of. The Admiralty themselves fixed that merchant ships, if armed, should have such fittings. They planned that class of gun and gun carriage. I could hardly do better than take their decision. The guns may turn round and look us in the face, as Admiral Lethbridge says. I would think the proper course is for the Government to settle the armament, and it would not be difficult to arrange, fit the slides in time, and made ready for the gun when mounted.

Admiral Hoskins gave us some excellent remarks, based upon what he had experienced in Australia, and I think his observations assist very materially the argument of my paper, which is that the mercantile marine should be made use of in good time to be effective, otherwise we are in danger of having our food supplies cut off, and if you have not got the steamers required in the Navy then you must employ the best thing you can find in their place.

Lieutenant Campbell asked if I could tell him how it would be possible to have a class of steamers to act as floating coal stations. There is nothing to hinder that. It is a simple and common-sense thing to do, and has been carried out over and over again. You would take merchant vessels of 1,500 to 2,500 tons, carrying 2,000 to 3,000 of coal, to distant stations. How are you to have coal, say at Singapore, Bermuda, the West Indies, the Cape, and elsewhere, during war, unless you send it in steamers?

Captain Long said that I was slightly in error in stating that "nothing was really done." If he will read a few words further on in the paper, he will see what I meant. I was referring to what the Admiralty did not do at the time they made their enquiries, and I said in the next line—"The inquiries of the Admiralty have been elaborately carried out, but nothing was settled or brought to a definite point." The answer to my statement is not that the Admiralty put fittings up for thirty steamers in the dockyards; there was no definite plan arranged with shipowners, and there is none yet arranged. With regard to the most valuable article written by Admiral Sir Spencer Robinson, and to which reference was made as having appeared in the *Nineteenth Century*, I would only say it was a singular coincidence that at the same time my humble paper was making its appearance; I never had the pleasure of meeting Sir Spencer Robinson, and I did not then know of his article; but I am very happy to find that so distinguished an Officer has brought the subject before the public.

Lord Alfred Churchill spoke of the "Grantly Castle," but ship A is not the "Grantly Castle." I have sought in my paper to keep away from any appearance of a personal aim in what I had to say. As to that vessel (A), which Admiral Selwyn tells us could be caught by the "Iris" I would say that the "Iris" would hardly beat her in speed; and as the "Iris" can only carry 3½ days' coal at full speed, there is hardly a comparison. Ship (A) might steam from here to the Cape, back to England and back again to the Cape without buying a ton of coal; and she would do that with a speed of 13 knots. That vessel is not a year old, and within a few months a foreign Power offered one-third more than her cost to buy her as the best type of a fighting cruiser they could find. The owners did not sell her to that foreign Power; our Government knew all about it.

Commander Gilmore said it would cost 20,000*l.* to convert each merchant steamer into a fighting ship. Really it would do nothing of the sort. It would not cost 5,000*l.*, or even much less. It was suggested by one speaker that I thought ship-owners had been badly used in not getting paid for their expenses. It was not my wish to express any such idea. It is not proposed that money shall be paid for the past. If the public service requires arrangements for defence, there must of necessity be pre-concerted plans; and the Government can easily find out what it would cost. But let them take the best boats and not have any unless the most suitable. The "*Hecla*" cannot be considered the type of a cruiser. She cannot steam 12 knots. The "*Hecla*'s" length is ten times her beam. I do not say that in disparagement; the question raised is whether that is the best type of boat to be bought and employed as a cruiser. I might say one word of a technical character, for I made the experiment and had it tested by the Government. Supposing compartment A in ship A was full of cargo and you allowed 30 per cent. for the extra weight, caused by the water entering that end and filling it, the vessel would only be immersed 2 feet 4 inches extra aft, and her speed would not be altered. If pierced in the bow she would draw 21 feet aft and 25 feet 8 inches forward, and yet would be quite seaworthy and able to steam about 11 knots. I speak of this by way of illustration. The Government will do well at its leisure to lay its plans of defence; and if it be determined not to have merchant steamers or that they cannot be usefully employed, that they should then make the Navy sufficiently strong in cruisers to protect our commerce and to assist the fleet.

The CHAIRMAN: I am sure I shall have the permission not only of the Council of this Institution, but of every member of it, and also of the public, to thank Mr. Donald Currie for the trouble which he has taken in preparing and reading this admirable paper. He has brought to bear upon his subject a great amount of practical knowledge and experience, and an acquaintance with details which has manifested itself not only in the paper itself, but in the reply to which we have just listened. I ask you, therefore, to permit me in your name to thank him cordially for the honour he has done us.