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The Strategic Importance of the Military Harbours in the British Channel as Connected with Defensive and Offensive Operations

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Eveuing Meeting.

Monday, April 20, 1874.

ADMIRAL SIR HENRY J. CODRINGTON, K.C.B., in the Chair.

NAMES of MEMBERS who joined the Institution between the 31st March and 20th April, 1874.

LIFE.

Custance, H. F., Col. 1st Norfolk Militia.
Jones, H. Helsham, Major R.E.
Ramsay, J. W., Commander R.N.
Brown, Sir W. R., Bart., Col. 1st Lanc. Art. Volunteers.
Gataker, Henry W., Lieut. R.A.
Waldegrave, W. F., Earl, Lieut. London Rifle Brigade.
Stewart, Walter, Commander R.N.

ANNUAL.

Blomfield, Thos. E., Lt.-Col., late 25th Regiment.	Page, G. H., Col. 47th Depôt Brigade.
Birley, R. K., Captain 19th Lanc. Art. Volunteers.	Rosser, George, Lieutenant, late 17th Lancers.
Gladstone, John R., Lieut. Coldstream Guards.	Pim, Henry R., Captain, late 3rd Huss.
Gatacre, W. F., Capt. 77th Regiment.	Barclay, Alexander, M.D., D.S. General.
Whitehouse, Alfred, Paymaster R.N.	Halkett, F. J. C., Lt.-Col. 2nd Tower Hamlets Militia.

THE STRATEGIC IMPORTANCE OF THE MILITARY HARBOURS IN THE BRITISH CHANNEL AS CONNECTED WITH DEFENSIVE AND OFFENSIVE OPERATIONS.

By Major-General COLLINSON, R.E.

I FEEL that it requires some apology from me, being a soldier, for venturing to speak upon a subject which is rather more nautical than military; but I have endeavoured to treat it as something more than a purely technical question, and I hope that the advantage that may possibly be derived from hearing the subject from a soldier's point of view will condone for the want of nautical information that I shall display. I have had the advantage of consulting some Naval Officers of great experience, although I do not wish to make them responsible for the opinions that I am going to express. I should also like to take this opportunity of acknowledging, as I dare say many other gentlemen in my position have before me, the very great assistance and attention that I have received from the Officers of this Institution.

The first thing that struck me when I began to think about the question, was the very great change that has come over the feelings of the people of England in treating military questions. I recollect the time when war was believed almost to have disappeared—at least from Europe—when armies and navies were tolerated only as a kind of police, and even this Institution was looked upon as a sort of museum of obsolete weapons. But now nothing excites public interest more than the operations of the Army and Navy, and the very appa-

ratus of war has created for itself a business in the workshops of the country; and as to the discussions in this Institution, they are becoming household words. There are many people who think that this is a very grievous prospect, and I have no doubt there are some who treat it as a sort of outburst of professional zeal. Whatever the cause, and whatever the effect may be, there can be no doubt of the fact that not only with the English people, but in all Europe, war has become a subject of national concern to a degree that would have been considered thirty years ago as quite impossible, and I draw the conclusion therefrom, that whether war is possible or whether it is probable, at all events the English people are in a mood now, to look the whole consequences of war straight in the face. Having that sort of feeling, I put the first question to myself, What are the interests of Great Britain that would be affected by any great war? and I read a remarkable book which was written by a remarkable man in his day, Sir Charles Pasley, about the war policy of Great Britain in the year 1808. That book is quite worthy attention now, for although the particular illustrations in it are become obsolete, the principles themselves are those of a brave patriotic Englishman, and therefore they are suited to all time. It was written with the object of rousing the people of England to a better appreciation of their interests at stake in the war, and of the importance to them of taking a more determined part in it.

While reading his arguments, based on the interests of Great Britain, then concerned in bringing Europe to a state of peace again, I could not but contrast them with the interests she has now spread over all the world, far beyond anything that was imagined even in those stirring times. Their limited commerce—scarcely a recognised colony—Canada little known—Australia a mere penal settlement—India a mercantile firm—their long, uncertain voyages in sailing ships—the sea commanded it is true, but as an element to fight on.

Compare this with the Great Britain of 1874; a commerce multiplied a hundred fold, and extending over all the world; one empire in India, another in Australia, another in Canada; the ocean ruled for our commerce by huge iron steamers, reducing sea transport nearly to the certainty of land. And these interests not only increased and extended to Asia and Africa, but what is more important, having new responsibilities added to them. The Great Indian peninsula is dependent on us for its progress, the rising States of Australia and Canada draw from the mother country their inspirations of social and political life: all are looking to a close connection with the British Empire as a vital element of their strength; all are prepared to assist in preserving the integrity of that empire. If England was then mightily concerned in keeping the peace of Europe, what are now her interests in keeping the peace of the world!

It is these peculiar responsibilities attaching to our connection with our great dependencies that create a new feature in our interests over the world. When Pasley wrote, thinking only of opposing French domination, he urged that alliances should be made and a footing secured, in such maritime States of Europe, as could materially assist us in controlling the power of Napoleon. And he pointed out that



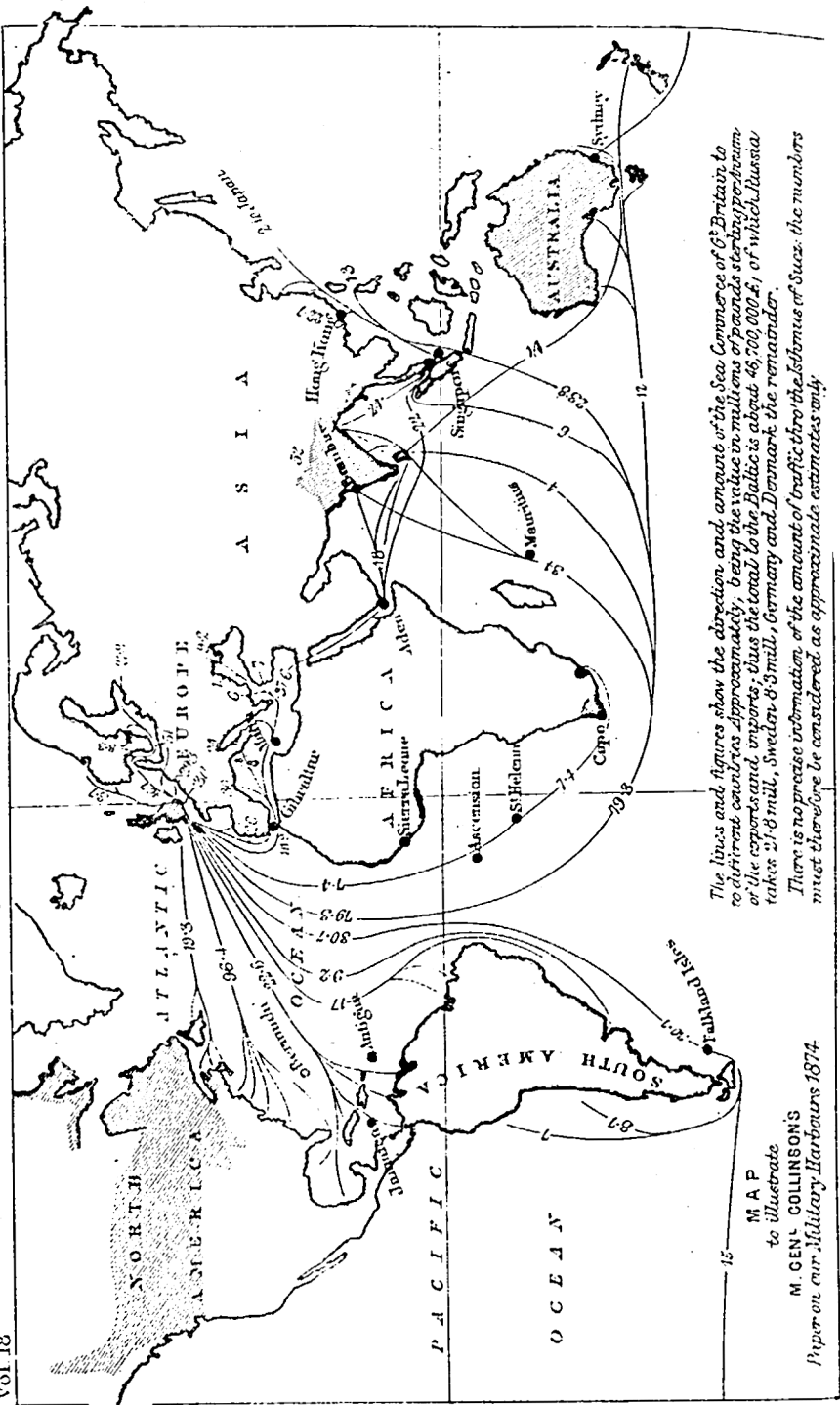
MAP OF
GREAT BRITAIN
 AND
IRELAND
 WITH THE HARBOURS ON THE OPPOSITE COAST
 OF FRANCE, GERMANY &c.

English Miles 69.15 = 1 Degree.
 Boundaries of Military Districts
 Head Quarters of Military Districts
 Brigade Depots
 To accompany Major Genl Collinson's Paper on
 our Military Harbours - 1874.

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THE SEA COMMERCE OF GREAT BRITAIN.

PL. X.



The lines and figures show the direction and amount of the Sea Commerce of Great Britain to different countries approximately, being the value in millions of pounds sterling, according to the reports and imports; thus the total to the Baltic is about 48,700,000 £, of which Russia takes 21,800,000, Sweden 8,800,000, Germany and Denmark the remainder.

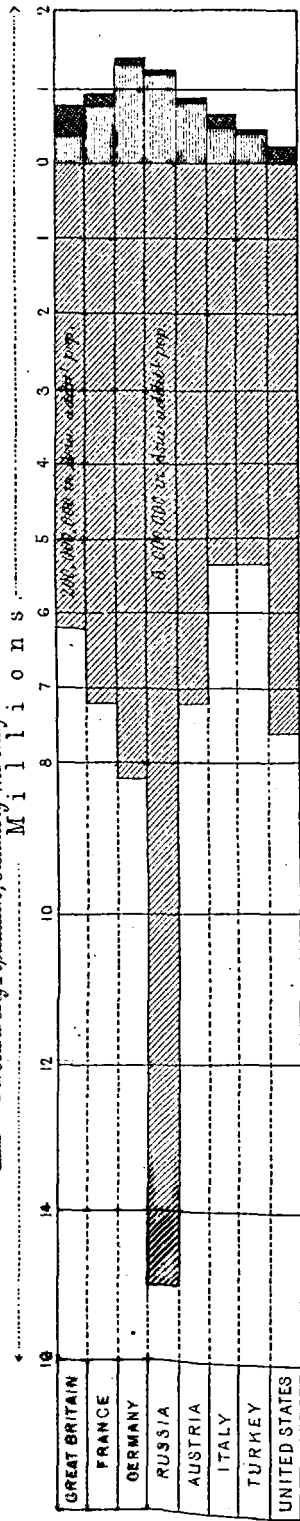
There is no precise information of the amount of traffic thro' the Isthmus of Suez: the numbers must therefore be considered as approximate estimates only.

MAP
to illustrate
M GENL GOLLINSON'S
Paper on our Military Harbours 1874.

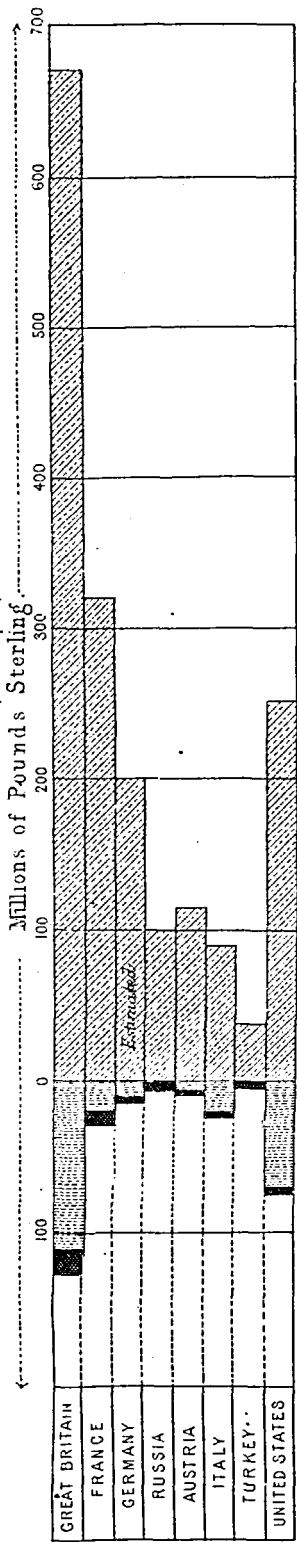
TABLES SHOWING THE WAR POWER AND THE FLOATING WEALTH OF THE PRINCIPAL NATIONS.

Tables copied from the *Statesman's Year-Book 1874*
and from *British Marine Armaments and Armaments*, a late
publication by the *German Statist. Dep't.* & accompany
MAJOR GENERAL COLLINGSBORN'S
Paper on our Military Harbours 1874.

The Male Population between the ages of 16 and 45 in 1872 (taken at $\frac{1}{3}$ the whole population.)
The Military Forces, War-Forging, exclusive of Volunteers and Local Forces, and of native Asiatic Troops
The seafaring Population, including War-Voyage



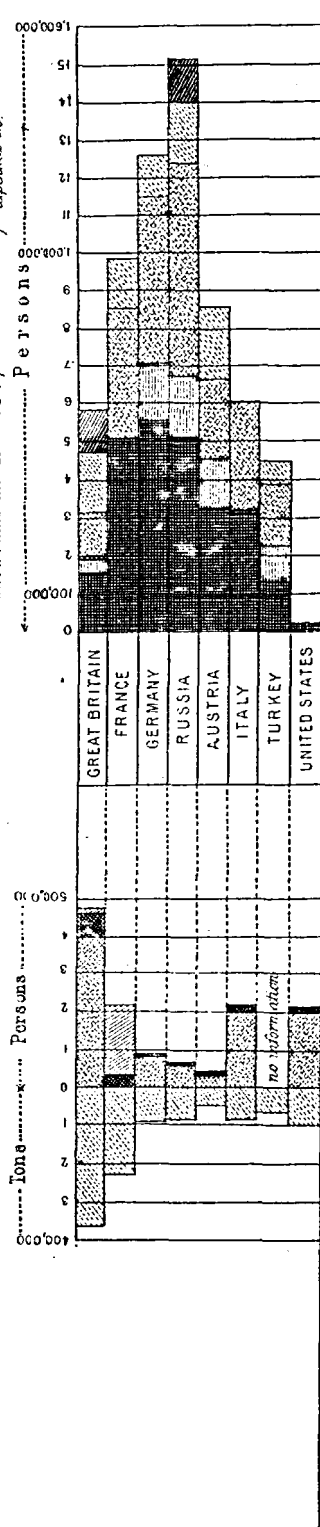
The value of Exports and Imports per Annum
The value of the Merchant Shipping at £ 20 per Ton
The value of Iron-Clad Warships at £ 40 per Ton



Seamens in War-Voyage
Reserve
Seafaring Population
Tonnage of Iron-clad Warships

Force always under arms
1st Reserve
2nd Reserve
Volunteers, Gardamars de
Navalistic Troops

In Great Britain this includes 60,000 British Troops in India only, this includes the 1st and 2nd Reserves of our Regular Troops, the number cannot therefore be depicted on.



with such assistance, the small Army of England would have the power of moving round the flanks of all Europe, appearing and disappearing, like the cavalry of the Desert on the flanks of an invading army.

The war policy that Pasley shadowed forth, can now be made a definite system, at the very time that it has become a necessity of our new position. But the alliances that we should make are those of Asiatic powers as well as European, and the flanks along which our invisible forces should move, are those of Asia and Africa, as well as of Europe. With the possessions we now have in the East, and with the alliance and support of Turkey and Persia, we have the power of moving our war forces at will, not only along the whole of the west and south flanks of Europe, but along the whole of the south flank of Asia, and well up the east flank of it.

It is a very remarkable circumstance connected with this increase of our responsibilities in the world, that side by side with that increase, there has grown up a new power of controlling them. The very discoveries in science that have enabled us to extend our interests, have also given us a new means of utilising the ocean, which more than counterbalances their extent; a means that enables us to use to a fuller extent than ever has been done before, the genius of our people, and the resources and geographical position of our island. This new power compels us, for the sake of our vast responsibilities, to have a new war-policy, or at least such a systematic adaptation of our former war-policy as amounts almost to a new one.

An important branch of such a war-policy is the position and condition of our military harbours; and in order to have a just appreciation of their relative importance, it is necessary that we should briefly consider the position of maritime warfare in the present day, and its connection with this new policy I have alluded to.

* The chart of the world shows approximately the floating wealth of Great Britain, both the direction of our sea commerce, and its amount. There is probably always afloat on the ocean, British property greater in value than one year's annual revenue. No other power has so great a portion of its national wealth so open to attack, and no other power imports by sea so large a proportion of the daily food of its people. About one-tenth of the whole exports and imports or about one-sixth of the whole imports of Great Britain, consists of food, coming in approximately equal proportions from Germany, Russia, and America, and the stoppage of which would affect us to a far greater degree and far more quickly than the stoppage of any other commerce to any other nation.

The coloured table shows approximately the resources of the principal nations of the western world. On one side are the powers of the nations for war purposes; on the other side are the interests they have at stake on the sea.

* This chart is a reprint of that accompanying Captain Colomb's paper on the "Distribution of our War Forces" read here in 1869 (see Journal, vol. xiii, p. 37 *et seq.*), with the annual value of the exports and imports of Great Britain, along the lines of traffic therein shown, given in figures. It therefore is only a very general and approximate illustration of the floating wealth of Great Britain.

I have shown the tonnage of vessels on the latter side, because, though a source of wealth, it is a very fluctuating source.

Maritime Warfare.

What is the object of maritime warfare? Certainly not merely the destruction of a hostile fleet, for the complete annihilation of an enemy's naval resources would not of itself necessarily terminate a war; there must be some ulterior object to be gained, of which the fleets are only the means. The defeat of an army generally results at once in the occupation of territory; the defeat of a fleet is only the loss of so many ships and men, unless it opens the road to some other advantage.

There are three distinct ultimate objects for which maritime warfare is undertaken—

1. The defence of our own sea commerce, or the injury of the enemy's.

2. The protection of our own country from invasion.

3. The invasion of the enemy's country.

Of these three objects, the first is purely naval, the two others are more or less combined with military operations.

In former wars in the days of sailing vessels, there was so much uncertainty in movements at sea, it depended so much upon the weather, and the ships themselves, and the skill of the crews, that all naval operations of every kind were necessarily left to be managed as purely professional matters. A Statesman or a General might invent a great war scheme, but directly the expedition left terra firma, it became subject not only to the "everchanging and mysterious sea," but to the technical rule of the seaman. This was of great advantage to the seafaring nations, for no power however mighty upon land, would venture to send afloat an expedition for any object whatever, if there was a probability of its meeting with a powerful fleet of any enemy belonging to those races whose "home is on the deep."

The introduction of steam power into ships has altered maritime warfare considerably in this respect, not only in degree but in kind. The power of moving in any direction at any time with nearly as much certainty as on land, has assimilated to a certain extent naval warfare to land warfare; it has made it possible to have a naval strategy as well as naval tactics, which was all that had hitherto been possible. That is to say, maritime expeditions starting from different points can be made to combine on one point for a particular object with reasonable certainty; at the same time preserving the other advantages of the sea. This property enables a statesman to lay down a plan of operations by sea with nearly as much certainty, and sometimes with more certainty, than he can by land. And the statesman of any great maritime nation who seizes upon this new power of war, and wields it to its complete extent, will perhaps create as great a revolution in war as Frederick the Great did by a new system of tactics.

It is the combination of this propelling power with the large size of vessels that brings the ocean somewhat into the condition of being

merely a means of locomotion, and a very favourable means, instead of being a special element, always doubtful and frequently hostile. And it is these two properties that bring into greater prominence the second and third objects of maritime warfare, as an effective means of terminating a war. The practicability of attacking an enemy from the sea on his own ground has been made so much more a matter of certainty, that all maritime nations are likely henceforth to adopt it more or less, as a part of their general war policy, because it gives to a weak naval power a new and formidable means of threatening and distracting their enemies; and to a strong naval power which has command of the sea, it almost places the balance of peace or war in their hands.

Captain Grivel, of the French Navy, in his interesting work on the future of French Maritime War (1869), points out that the inferior naval Power in a war should avoid sea battles, except under special strategic advantages, and should act mainly by cruisers against the enemy's commerce; whereas the strong naval Power having virtual command of the sea, should attack the enemy's territory and, where possible, its fleet. He compares, what he aptly calls, the "vulnerable surfaces" of different nations from this point of view. The vulnerable surfaces of England are tolerably illustrated in the chart of the world.

Naval operations will henceforth have these advantages over land operations, that they will be more secret, certain, and expeditious, they may cover a large area of action, and the plans can be more easily changed. Before we proceed to apply these ideas to the special question of our strategic harbours, it will simplify the consideration to eliminate two classes of harbours that have distinct requirements, from the strategic harbours proper; these are *coaling stations* and *arsenals*.

Coal.

Coal is almost the key note of the question we are considering tonight, as well as of the larger question of our war-policy. While steam power gives us the advantage in large vessels of being able to move with certainty in any direction, it is coupled with this drawback, that there is a limit to the distance, and up to the present time a short limit. Sailing vessels with all their uncertainty, have this great superiority, that they can go on as long as they can get food for the crew.

The range, as I may call it, of a steam fleet, depends, supposing them to be similar vessels, on the quantity of fuel they can carry, and when a steamer loses her power of steaming, she is worse than a sailing ship. And unless there is a coal depôt at the further end of the voyage, the effective range is really limited to half the distance for which the steamer's coal can carry her; and therefore without that assistance, half the effective time of a steam armament would be lost in going to coal, and half the stowage power would be lost in carrying fuel only to enable them to go and get more fuel.

Hence, if such a war-policy as we have been speaking of is to be carried out in its most effective state, it is indispensable that there should be secure coaling stations in such situations and in such numbers as shall as far as possible reduce such waste of time and

stowage to a minimum. For it is manifest, that if our Navy is so worked up to its full extent, the provision of suitable coaling stations will allow the number of vessels to be considerably reduced below what would be necessary if they had no such assistance to fall back on.

Such coaling stations are to a steam fleet what the depôts of reserve ammunition are to an army. The French Admiral Jurieu de la Gravière in his work on "*La Marine d'Aujourd'hui*," (extracts from which have been read at this Institution,) indicates how greatly the want of such depôts is felt in the French Navy, for the realisation of a system of maritime warfare in the present day, for he says, "it is impossible to undertake such operations if the fleet be not accompanied by a complete train of store and provision ships—and above all for coal. The transports must be as swift as the squadrons whose operations they must accompany." Is not this powerful evidence of the advantage which a maritime people which has carefully provided such depôts beforehand, will have over all nations not so fortunate or so prevoyant?

We have some guide as to what I have called the effective range of a modern war steamer, from the high authority of Mr. Reed, late Constructor of the Navy. In his book upon ironclad ships (1869) he gives us the speed of steaming and coal-carrying-power of our principal armoured ships, and of some of the most powerful unarmoured ships of war, of which the following is an extract:—

"Ranges" of Ships of War.

	Coal power.	Total distances to which that coal will carry them.	
		At 12½ knots.	At 11 knots.
	tons.	knots.	knots.
Maximum of unarmoured ships } ("Mercy").....	850	1550	2320
Maximum of armoured ships } ("Monarch").....	600	1560	2310

The distances are materially decreased (as Mr. Reed points out), or in other words, the consumption of coal is materially increased, when the speed is increased only slightly at the high rates. But I have taken the maximums, because the power of steaming is on the increase, and because the coal-carrying-power of the great passenger steamers and of our great transports is considerably greater than that of our war ships; and also because under war-pressure, steamers are likely to be forced up to their full powers. Looking at our war-policy in the light I have done, the importance of increasing the range of our war ships is evident.

At present we may take it that a war-steamer's fuel will carry her from Southampton to Gibraltar, but not to Malta; to Halifax, but not to Bermuda; to Cronstadt, but not back again. But we may no

doubt fairly anticipate an increase in the range of war vessels, so that an armoured ship will be able to reach Malta, and a steam transport Alexandria, from Southampton without coaling again. This affords us a sort of measure of the interval at which our coaling stations should be placed along the lines of our ocean traffic over the world. We have now many such coaling stations along these lines, but it will be seen upon consideration of the chart of the world accompanying this paper, in which the lines and amount of traffic are laid down, that additional ones are still required. These coaling stations it must be remembered are required for other war objects besides the protection of our maritime commerce. The question of their provision in foreign seas is also connected with the subject of making coal a contraband of war. As long as we possess the main supply in our own hands of this indispensable war-material, it is manifestly to our advantage that we should keep up a stock of it at all these necessary points, and that it should be contraband: as in such case the absence of such provision by an enemy would cripple all their maritime operations, and eventually stop them altogether. But my business now is not so much with regard to these outlying ports, as to what is required round the coast of Great Britain.

When we come to the coasts of Great Britain, the coaling stations must be much closer together. The war-ships defending a coast line must be so disposed as to be reasonably certain of being able to attack the enemy's invading force before they have completed the disembarkation; and a disembarkation from the time of the first appearance of the vessels on the horizon is, in these days of powerful steam vessels, a question of hours not of days; and the single guardships of the coast should be so stationed as to be within a few hours' reach of such parts as are likely to be subject to the visits of the enemy's cruisers. The requirements in a coaling station for war vessels are, first and chiefly, smooth water; secondly, facilities for coaling both from wharves and by barges or vessels. The filling up of a large war steamer with coal takes 10 or 12 hours when done in the most expeditious manner. Thirdly, a coaling station should be fortified against an attack by sea, otherwise you will be providing a depôt for your enemy; and not only against an attack by day, but against any desperate attempt at night to burn the stock of coal by special vessels prepared for the express purpose. The coaling places for large vessels on our coasts are not so many as might be expected; and few of them meet the above requirements.

Without going into details of the different harbours, there are about 20 places round the coasts of Great Britain at which the largest war vessels could lie and coal, and there are only four of these that fully meet all of the above requirements; moreover, of these, three are near together on the south coast. Of the others, they are either tidal or difficult of access, or are not protected by land works, and only at Portland is there any special arrangement for coaling. At three or four of the others there is only a coaling hulk; whilst for a distance of more than 150 miles on the part of the coast most exposed to attack from the Continent, there is no provision for coaling of any kind. A

guard-ship therefore would have to be absent from her station at this part for probably 30 hours for the purpose of coaling. The completion of the harbour at Dover would remedy this serious defect, and would provide the remedy at the point most favourable for the position of the guard-ships.

The fact is, our ships have outgrown our harbours. It would be waste of money, with the prospect of the increased size of vessels, to go on endeavouring to improve matters in harbours, only available to certain of our war vessels. Evidently the more desirable course would be, gradually to complete those places, which are available for our largest vessels, until they are provided with all the above requirements. The actual arrangements for shipping the coal may be left to the ingenuity of our engineers to supply when wanted; but what cannot be done at the time are the land defences for securing the coal when there, and without which a certain portion of our fleet would be employed acting as sentries over coal-hulks round the coast. Falmouth may be taken as a specimen; a fair deep water harbour in an admirable position, but so far as its defences are concerned, pretty much in the condition in which it was left by Henry the Eighth.

I have not alluded to the supply of coal to war-vessels in roadsteads or the open sea, because I consider such a method to be exceptional, an expedient only to be adopted in war time to supplement the permanent depôts.

I did not also think it necessary to include in the list of requirements that there should be a supply of coal at each station. But I mention it, because in time of peace it is a subject that gives rise to difficulties, not being felt to be so important. Considering its vital necessity in war, it is of great importance to establish some system of securing our war depôts of coal over the world, as shall obviate those difficulties, as far as possible.

Naval Arsenals.

The next accessory on land for the prosecution of naval enterprises that we will consider, is that of arsenals, or, as we more commonly call them, dockyards. If the coaling depôts are like the ammunition trains of an army, the arsenals are like the grand depôts of stores which an army requires at some secure point of its main base of operations. They are indeed more important than these, because in every fleet there will be some ships after every engagement, and, indeed, after every heavy gale, that will require such repairs as can only be effected in a properly equipped dockyard. The absence of one within reasonable distance might deprive a fleet for the whole of a campaign, of some of the disabled ships in it, and perhaps cause their total loss.

There should be within the limits of the station of each separate fleet, one such arsenal, in which armour-plates can be removed and replaced, steam machinery repaired, guns and carriages refitted, and the bottoms of vessels examined and cleaned.

There is this difference between a coaling station and an arsenal, as regards position, that the former should be as easy of access as prac-

ticable, whereas one of the most important points about the latter is, that it should be as secure as possible from all attacks by land or sea; because, if the enemy could seize or destroy it, its loss to you would only be exceeded by the great gain to the enemy, if they could get the use of it. Probably the operations of a great maritime war will now turn very much on the securing of such refitting harbours in favourable positions in the sea of war. They are not so much the strategic camps of the ocean as the objective centres of offence and defence.

Great Britain has several such centres in the different seas where her interests lie, but there are some seas in the East where others are still required, where our commerce and other interests are very large, and where the war vessels protecting them would, in case of certain repairs being required, have to go some thousands of miles, and be absent many weeks, and perhaps months, before they could be effected. When we come to our own shores, we find several such arsenals, more, indeed, than are perhaps now required for a steam navy in the positions they are in. If we could now determine afresh the positions of our dockyards under the new light of steam warfare, and of the present condition of the continent of Europe, we should perhaps be inclined to have one on the north-east coast and one on the north-west coast, instead of Plymouth and Milford Haven. Of our five imperial dockyards, three, Chatham, Milford, and Cork, are reasonably secure, by their natural position, as well as by their fortifications, from attack by sea; Plymouth and Portsmouth depend, in this respect, mainly upon their artificial defences. Moreover the outer harbour of Plymouth is, like Cherbourg, very open to audacious assault; the outer harbour of Portsmouth, through a fine, strategic anchorage, from its having two entrances at opposite ends, is not a satisfactory one for large ironclads, on account of the exposure to sea, winds, and tides, and the inner harbour has the very serious defect of being tidal.

These places are, however, legacies that we have inherited from other days, and which we shall probably have to make the best of to the end of our history; and it must be borne in mind, that they are extremely valuable for other purposes than arsenals; as places of shelter for our merchant vessels both in times of peace and war, they have a commercial as well as a military value. In the meantime there are mercantile yards on the north coasts available for the repair of all but our first-rate war ships, such as on the Humber and the Tyne, on the north-east coast, and on the Mersey and the Clyde, on the north-west coast. The deepening of the waters in these rivers and the defence of them, will some day, perhaps, become a question for the consideration of the Admiralty, and will probably have a bearing on the subject of a second great military arsenal for Great Britain.

On the subject of artificial defences of naval arsenals, I will take the opportunity of saying,—and I have little doubt that my brother military engineers will concur with me,—that we engineers have never supposed that fortifications are a universal panacea against an enemy, to the exclusion of other means of defence. Fortifications are the means of enabling you to set free so many more men and ships for that

offensive warfare which is the *only true defence*. If all our naval arsenals were so placed and fortified that we should feel them perfectly secure in the hands of our Militia and Volunteers, then the whole of the regular forces of Army and Navy, thus freed from restriction, would be available to effect greater injury on the enemy in other ways, and thus bring the war to a quicker termination. The vast number of vessels that will be required to protect the interests of England on the sea in war time, will probably astonish those who trust entirely to ships for our defence.

Strategic Harbours.

I now come to what is the important question of this paper, and indeed, of maritime warfare, as far as accessories on land are concerned, for it involves the subject of the general system of conducting maritime war in the present day. I feel, therefore, that I am treading on delicate ground, and am opening myself to professional criticism. As, however, the opinions of Naval Officers themselves appear to be uncertain on this point, there is more excuse for a soldier venturing to express his.

This important question is that of the best position for those anchorages and harbours of refuge, which would be used from time to time by a fleet operating in any sea, or by a disabled or overpowered squadron, for temporary shelter and refitting, and which, therefore, being the pivots of their movements, may be more properly called strategic harbours, in contradistinction to coaling places only, and to arsenals only. A strategic harbour ought to be easy of access, large enough to hold at least a squadron—some in special positions should be capable of containing two or three squadrons—and it should be fortified towards the sea.

It will be convenient to consider them in respect to the three objects, which I have supposed to be the ulterior intentions of all maritime war. 1. The attack and defence of sea commerce. 2. The defence of a country from invasion. 3. The invasion of a country.

1st. *The Attack and Defence of Sea Commerce.*—Considering the command we have of the sea, and the extent of our sea commerce, we must expect that the first idea of any power at war with Great Britain will be to get their war-fleet out into the open ocean, to attack that commerce. The extraordinary effect on the sea commerce of the Northern States of America, by one or two improvised cruisers of the Southern States, and at a time when the North had shut up the war vessels of the South in their posts, has been more than once pointed out in this Institution. The question therefore arises whether such blockading of the enemy's war vessels is practicable in these days, and even if practicable, whether it is likely to be effectual for the purpose. As far as I can ascertain the opinions of Naval Officers who have considered this point, it appears to be extremely doubtful whether an effective blockade can be maintained in the face of the large, swift, steam-vessels of the present day. Blockade-running has become in these days of steam, more of a regular business than it was in the days of sailing vessels. The

power of choosing the time and direction for the escape of war vessels blockaded; the time lost in turning large ironclads to pursue a flying steamer; the probability of some of the blockading vessels being deficient in coal, or absent coaling; and the loss of strength in parcelling out our naval power among a large number of ports widely apart, are the chief reasons against continuing the system of blockading war harbours.

Steam-power is in favour of the assailants, and in this case the escaping party is the assailant.

There might be wars in which such a system would be effective. For instance, if we were at war with only the two great Powers of Northern Europe; if we had possession of the Dardanelles or Bosphorus, and of Copenhagen, that would go far to checkmate the naval power of our adversaries. But although this shows the importance of preserving a close alliance with both Powers that possess harbours in such important positions, it would not shut up the naval power of North Germany. And again, if we were at war with the Great Powers of Southern Europe, there would be no possibility of so easily excluding them from the sea of operations.

Therefore it appears probable that, on the whole, for this important branch of naval warfare, fleets will in future work on, what we should call on land, interior lines; and that the most useful positions for strategic harbours will be just in rear of those lines, to continue the military simile. The swiftest vessels would be watching the enemy's movements, like the outposts of an army; squadrons would be detached to cruise in certain lines for the protection of the sea-traffic against single cruisers, with instructions to keep up frequent communication with the main body of the fleet, which would be stationed in some position most favourable for moving in the directions in which the enemy's main fleet might operate.

The best strategic lines for the defence of a sea, are in some respects the reverse of those favourable on land for covering a tract of country. On land a convex line is favourable to the defenders, because they can move by the interior lines, shorter than the enemies round the circumference; but at sea, with the land behind you, preventing your moving by those interior lines, the most favourable line for defensive strategy would be a concave one, and the best position for the main body would be near the centre of the curve.

Again, it seems probable that indefinite cruising by independent vessels will not be carried to so great an extent as has been the case heretofore. A cruiser must be a very fast vessel, and must always keep a reserve of coal on board to carry her to a friendly port. Such ports, where she can obtain a supply of fuel, though it is not a contraband of war, will, in the case of any country at war with Great Britain, be few in number; hence the range and the area of operation of such a vessel will be limited; and therefore cruisers will probably act in the shortest lines from their harbours of refuge that will effect their object.

The defence of sea-commerce will probably be conducted on similar ideas. Fast vessels will patrol along certain lines, from one friendly

port to another, if possible, across the line of traffic, and so as to cover as much of it as practicable. Precise courses and precise points of rendezvous would be laid down for these vessels, in order to keep as constant a watch as possible over the line patrolled. The number of vessels employed on this duty would depend on the length of line to be patrolled; or conversely, the lines of patrol adopted would depend on the number of vessels available. This would, I conceive, be a more effective and economical mode of protecting the traffic, than by attempting to follow the enemy's cruisers in the open sea, as such a plan would require more vessels than even Great Britain would be prepared to furnish. Any arrangements for the supply of coal in the open sea would, of course, enable the lines of patrol to be lengthened; and the means of speedily communicating intelligence at sea would become a matter of great importance, as telegraph cables must not be depended on in war time.

It must also be considered that in war time, only fast merchant steamers would be employed in commerce.

With regard to the disposition of the main body of a fleet, I presume that the object of the *inferior* fleet would be to concentrate at some time and place unknown to the superior fleet, so as to meet it, if possible, in greater force, and that for this purpose, a great deal of manœuvring and feints would be employed, to divert the attention and separate the forces of the superior fleet. The concentration would take place at sea and not in harbour, otherwise there would be the risk of the superior fleet shutting up the chief part of the enemy's naval forces, and it would then be worth while to institute such a blockade of that one harbour as would do it effectually.

The object of the *superior* fleet would be to prevent, if possible, this concentration, and to overpower the inferior fleet in detail; and it would therefore cruise in such a course as would enable it to keep up its intelligence along the probable line of the enemy's operations, and to intervene before the junction. But this main body must have coal as well as the cruisers, and the number of vessels required to form an effective fleet on such service will be in some proportion to the distance of the coaling station from its line of operations.

The French Admiral above quoted seems to have had some such idea as this in his mind, when he says, in the same work, "What our (the French) Navy has done in the last 50 years is nothing to what it will have to do in the event of a naval war. I have very often sketched in mind the constitution of a fleet which could at any moment unite its scattered fragments, and concentrate formidable masses on two or three previously chosen points. . . . I revived on a larger scale the plan of 1805, convinced that the fleet which can most promptly concentrate, ought to be able to keep for several months the advantage gained in the first few days." This is naval strategy. Not dispersing your fleet in the attempt to prevent the enemy's ships from leaving their harbours at all, but so disposing it as to be able to concentrate and meet the enemy's fleet in superior numbers, before he has accomplished his object. This is what steam has rendered possible.

What, then, should be the disposition of our fleet, and what strategic harbours are suitable for the protection of our commerce in the neighbourhood of our coasts? The line of British cruisers watching the south-west approaches to the British coasts would probably extend from Cape Clear to Land's End and Ushant; the position for a fleet supporting them would be probably at Plymouth. We have fortified strategic harbours at Cork, Milford, Plymouth. As *time* is the essence of naval operations now, Falmouth would be preferable to either of the others as the place for the main fleet, being in an advanced and central position, from which the Admiral would most readily obtain his information from his fast steaming scouts; but Falmouth is not large enough for such a purpose, and not fortified. Therefore Plymouth, being now a commodious and accessible harbour for large war ships, would probably be the head-quarters as far as the protection of this part of the coast is concerned; the other harbours would be the places of refuge and supply for the cruisers.

We have two fortified harbours further up the English Channel, Portland and Alderney, which, being only 60 miles apart, are favourably placed for the support of cruisers, which would thereby effect the double object of closing the Channel at that line, and of separating Cherbourg from the other French war ports. It may, however, be doubted whether it would have been now worth while to construct a harbour at Alderney for these objects; as the harbour exists, and is of that value to us, and would be of very great value to an enemy, it is desirable to hold and maintain it. During the late war between France and Prussia, if the French had possessed a harbour off the coast of North Germany, they would doubtless have carried out their idea of invading the Prussian territories at that point: Alderney, in possession of Prussia, would be just such a harbour as regards the invasion of France or England.

But when we come to the other ends of the two British channels we are not so well provided with fortified strategic harbours. In the North Sea the line of cruisers would probably extend from the Frith of Forth to Heligoland, with outliers as far as Aberdeen: and the position for a fleet supporting them would probably be Yarmouth Roads. We have two deep-water rivers on this coast, the Thames and the Humber, but the safe anchorages in them are not so easily accessible as should be the case in strategic harbours; and in neither of them are they fortified. Harwich Harbour, though fortified, on account of its depth of water and difficulty of access, cannot be considered as available for a large war fleet. Then there are three anchorages, the Downs, Yarmouth Roads, and the Frith of Forth, all in favourable positions, but roadsteads only, not harbours, and imperfectly defended from the shore; and therefore suitable only for fleets of such size as are not likely to be attacked by a superior force. There are no fortified harbours north of the Humber suitable for the refuge of cruisers. There therefore appears to be required on the north-east coast, both for coaling and for the refuge of disabled or overpowered squadrons, a smooth-water harbour, easily accessible, and well defended from the shore.

At the north end of St. George's Channel a line of cruisers from

Lough Foyle to the Mull of Cantyre would close it, and would be supported at each end by the excellent harbours of Lough Foyle and the Frith of Clyde, which only require fortifying to make them effective for this purpose.

But we must consider what would be the ultimate object of the supposed inferior fleet in endeavouring to surprise the superior fleet and defeat it in detail. This might be either to leave the enemy's commerce more exposed to attack, or to cover a disembarkation in the enemy's territory. It is the latter of these considerations which I think would determine the position of the main body of the home fleet of Great Britain. If the home fleet was divided among the different small seas surrounding Great Britain for the protection of our commerce, it would be liable to be attacked in detail by the combined fleets of our enemies.

However important the protection of our commerce is, it is more important to protect London, and until London is otherwise made secure, it will probably be found indispensable to keep the main body of the home fleet massed in the Channel.

We cannot expect, with the demands of the other parts of our empire, to be able always to keep such a proportion of fleet round our own shores, as will be superior to any probable combination of enemies' fleets. It is, therefore, important that it should be so disposed as to be capable of quick concentration, and of moving to either sea. If London is ever made secure against capture by other means, it might be practicable and advantageous to employ the whole of the home fleet elsewhere.

Portsmouth is in a favourable position in this respect, but considering the increasing power of the two great Northern countries and their proximity to our shores, Portsmouth appears to be rather too far from the east coast. This again points to Dover as a suitable position for a strategic harbour. If completed it would fulfil, in all respects, the requirements of one, and it is situated in one of those positions marked out by nature for the command of sea traffic. The Straits of Dover are the gates dividing the sea traffic of Northern and Southern Europe. The Channel fleet divided between Dover and Portsmouth, would be in good strategic positions for combining and acting, either in the North Sea or St. George's Channel.

2nd. *For the Defence of Great Britain against Invasion.*—I am not going to discuss the possibility, or even probability, of such an event ever occurring as a determined invasion of England; that would lead me far away from my present subject, and re-open a question already well settled in this Institution. Our object to-day is to consider what accessories on land in the way of harbours are desirable to enable the smallest naval force spread round our coasts to render such an undertaking a desperate adventure, leaving the mass of the fleet still available for offensive warfare. And I will assume that some time during the course of a war our enemies see an opportunity of distracting the attention and dividing the forces of this country, by making deliberate preparations for invading it on a large scale. And we must bear in mind that the preparations and the threat would be sufficient of them-

selves to rouse the people of England to make as complete arrangements for defence as would be required if the threat were fully carried out.

The main object of any such expedition would be the capture of London; no foreign Power would undertake so tremendous an adventure except for such a prize. But in addition to the main attack, there would be other attempts at landing in distant parts of the kingdom for the express purpose of dividing the attention of the defenders: indeed such subordinate expeditions would probably be undertaken, whether the grand enterprise came to a head or not. Any landings, however, effected at such a distance from the capital as would allow time for the massing of the defending forces between it and them, would not have the capture of London for their object, but either the levying of contributions from some of our wealthy provincial towns, or the fomenting of insurrection.

The levying of contributions from undefended towns by war-ships we are sometimes inclined to consider as a relic of barbarous warfare that will soon be exploded from the international code. But besides the fact that one great maritime Power has not yet joined the league against privateering, we must not expect that any Power will forego the opportunity, if it has the power, of inflicting injury on its enemies by making requisitions by sea as well as by land. Therefore it is necessary for us, who have so much to lose in that way, to make the rivers and harbours near our great mercantile towns as secure as practicable against such subordinate expeditions. We have several such places as at the present moment offer a very tempting bait to a small force. There is little to oppose the assault, and an extraordinarily rich booty to be gained. For the rest of the coasts of Great Britain and Ireland, all that appears necessary is to provide some land batteries at such harbours as are most suitable for a landing.

But for those parts of the south and east coasts which are so near to the metropolis, and also so near to the continent of Europe, as to invite the attempt of landing a large force for its capture, the defences should be much more multiplied. Every small harbour should be protected as far as practicable, and at every anchorage and landing place there should be batteries. The special vessels for guarding the coasts and the coasting trade, which would doubtless be stationed all round Great Britain in such times, should be multiplied on these parts of the coast; every small harbour would be a port of refuge and supply for those vessels; and the land defences would be a support and protection to them, as well as to the vessels employed in the coasting trade, which would have to take refuge in the harbours and anchorages. Where land defences can be applied in such situations, it must be recollected that they not only enable you to reduce the number of sailors and ships required for the defence of our coasts, but they supplement them at a very much cheaper rate. For the same expense for which one gun can be mounted and kept effective in an armour-plated vessel, about ten guns can be mounted in the strongest manner and kept effective on shore.

Every additional defence of this kind tends to put the coasts in the

position of the bank of a river which the enemy cannot get at. It enables single vessels of war or commerce to pass with impunity along the coasts almost in presence of the enemy. It is difficult to define a distance apart for such defences: the minimum distance is of course the effective range of large guns; the maximum distance should depend on the probable number of the enemies' cruisers and on their distance from a coaling station. And it must be remembered that every harbour left undefended is not only a loss to your own vessels, but a gain to the enemy. Captain Grivel alludes feelingly to the undefended French harbours.

It is remarkable that Dover is situated at about the centre of that part of the coast, which I have considered the most liable to invasion; therefore a war fleet stationed there for other war purposes would be in the most favourable position for acting against any force coming from any direction with the serious intention of endeavouring to land and capture London.

3rd. *The Invasion of an Enemy's Country.*—There is one more branch of maritime warfare in the prosecution of which the assistance of harbours are indispensable, and that is the counterpart of the last one, namely, the attack of an enemy's territories; and this is the branch which I have considered as likely to be of more importance to a maritime Power like Great Britain than it has hitherto been. I have supposed it probable that a foreign Power at war with us would seek to divide our forces, both naval and military, by threatening an invasion of our territory in different parts: this might be the British Isles or one of our colonies; wherever it was, it would have the effect of obliging us to detach men and vessels for its defence. But in the present condition of the naval forces of the world, there is no foreign Power which could undertake any such expedition on a large scale to any considerable distance on the ocean with a good prospect of success. To have a fair prospect of succeeding under these conditions the country must have a certain amount of command on the ocean, a powerful steam transport fleet, and coaling stations and harbours, near the coasts to be invaded. Great Britain is at present the one Power which possesses these requisites to any degree, and she possesses them, or could possess them, to a degree so much beyond any other Power, that it might become an exceptional war-power in her hands.

The general idea of making the war-policy of Great Britain one greatly of combined naval and military operations is not a new one. Sir Charles Pasley wrote his celebrated book on the war-policy of this country mainly to support that idea. He wrote in the midst of the excitement of the great European war of 1803, when Napoleon was wielding enormous armies on the continent of Europe, and when movement by sea were retarded by the cramped and uncertain means of small sailing ships. But that able and energetic man was so impressed, even then, with the advantages to England of such a policy, that he actually contemplated having 150,000 men ready in England to be transported to any coast in Europe. How much more advantageous would such a policy be to us now, when our colonial interests are so very much larger, and when the use of steam power, and especially of

large swift steam-vessels, opens the door of the sea to us. From henceforth we may expect, to use the words of Captain Hoseason, R.N., in his pamphlet on the Transport of our Army, that "*England's base of operations is the ocean.*" Here I wish to take the opportunity of acknowledging the information and benefit I have received from that Officer's various writings on these subjects. And we may expect that it will be acknowledged before long, that one of the surest guarantees of peace will be the knowledge that Great Britain has deliberately and carefully prepared her war forces, so that a complete little army can be embarked in a few days' notice, in large transports capable of conveying them with certainty to any part of the world.

This would not be the adoption of a new policy, but only the reduction to a determinate system, of a scheme of operations that has hitherto been left to be settled by the chance opinions of the day, and to be carried out by such means, in men, stores, and transports, as could be hastily got together for the particular purpose in hand. It is one which quite belongs to the traditions of our own race, and indeed has been the policy of all the great maritime nations recorded in history. As long as they were powerful, their plan of war was to invade the enemy's country from the sea; when they ceased to be so venturesome, it was because they were ceasing to be so powerful; and considering the vessels of the time, some of these expeditions were as large and as distant as the transport of an Army across the Atlantic would be to us. In our own day the French have deliberately utilised their war fleet for similar purposes, to their great advantage in more than one late war. During the last war between France and Prussia, the possibility of the landing of a French force on the northern coasts of Germany kept several corps of the Prussian forces lying idle quite away from the scene of the great operations.

To Great Britain, in its present circumstances, it appears to me that a war policy based on this idea is not only advantageous, but a necessity. The preservation of our connection with India makes the alliance of Turkey a matter of importance to us: for the security of its western frontier the alliance of Persia would be most valuable; and if either of these two Powers was threatened by our enemies, we could support them in the most effective manner by landing in their territories a force large enough, when combined with their own troops, to form an effective Army, and so get the advantage of having their country as a base of operations; while at the same time we could distract and harass the enemy by appearing on his own coasts, with a small force, such as could be easily disembarked and re-embarked, and moved from one point to another, quicker than his troops could move by land. But such a system to be really effective, must not be left to be carried out by such small contingents of troops as happen to be available at the moment in England, and embarked in such hired transports as can be found in the market, and supplied with such stores as happen to be left after the last reduction of the Estimates. We have happily got already some way beyond that haphazard way of drifting into war; but we have not quite arrived at the conviction, that the wisest and most economical and pacific course is to frame our whole war

forces on it as a national system. To organise some part of our Navy for the express purpose, and to organise some part of our Army for the express purpose of transport in ships, so that the sailor and the soldier will feel themselves to be comrades in the same expedition.

An important part of such organization must be the means of quickly embarking large bodies of men and stores at some favourable points on our coast; and this is where it concerns the subject we have now under discussion. It is remarkable, considering how often we have found ourselves compelled to send away a little force to foreign wars, that there are no arrangements at any of our harbours expressly for the purpose. The transports lie alongside the dockyards or arsenals as they can, and in times of war-pressure, those places are absolutely choked with work; and the chief port of embarkation, Portsmouth, being a tidal harbour, is liable to delays, and so to greater pressure. The harbour of Dover, if completed, would be a most convenient place for this purpose, because the embarkation could be effected in smooth water at all times of tide, and in several vessels at once; and it is accessible by three independent lines of railway from our great military and naval centres of Woolwich, Aldershot, and Portsmouth.

Summary.

I have not herein proposed any new project for the defence of the empire, but only the completion into a more perfect system, of that policy which has been already begun.

It may be described generally, as the effecting of the security of Great Britain itself by local means, and the systematic and combined organisation of the regular Army and Navy for offensive action against the enemy.

This will, perhaps, be thought to be a more aggressive policy than that which this country has generally followed. I don't think it is likely that Great Britain will ever be accused of having an aggressive policy; her vitality depends so much on peace, that her greatest enemies must acknowledge that she has nothing to gain by war and much to lose. Hence the best war-policy for her, is that which will soonest bring peace—peace without injury.

I maintain that the policy herein advocated is not only the most effective to that end, but is the only one by which Great Britain can expect to be able to terminate a war, except to her own loss. The multiplying of sentinels by sea or by land round our coasts, the escorting of our own sea-traffic, or the stopping of that of the enemy, will not of themselves bring a war to a conclusion satisfactory to Great Britain, because she herself is the only Power that would be vitally affected by a war system of that nature.

But there is the other argument in favour of its adoption by England, that we are the only nation that can use it effectually. Our coal and iron, our adventurous seafaring habits, our insular position, together constitute a special power in the hands of this country, so remarkable at this epoch of our history, that it would almost seem to have arrived at its perfection for the express purpose, and at the express time required for the security of our interests.

I might also advocate it as a necessity, on the higher ground of our responsibilities to those nations placed under our protection; but as that argument would lead me altogether beyond my subject, I will content myself with a final reason in its favour, of a more homely character, namely, that it would be economical. The combination of our war forces by land and sea into one system would, no doubt, lead to our having a War Department in reality as well as in name, and could, therefore, hardly fail to produce economy, not only by direct reduction of certain expenses now required in duplicate, but by the greater efficiency and more determinate action of a single controlling power over our war policy. It would realise the idea of one of the wisest soldiers of our day, Sir Henry Harness, of the Royal Engineers, that, "The War Minister of England should be strategist of the empire, " and the units he should deal with, are Fleets and Armies."

Lieut.-Colonel CROSSMAN, R.E. : If you will allow me I should like to speak, as having had some conversation with Captain Hoscason I find that he has some views in the matter which he would rather bring forward after he has heard what I wish to say. General Collinson has referred to a harbour on the north-east coast of England. Now in making remarks upon a harbour on the north-east coast one must not only go into a strategical subject entirely, but must also show the necessity for making a harbour there, independently of the strategical reasons for so doing. We are all aware that the trade on the north-east coast is as important, if not more so, than that upon the rest of the coast of England; and many of the ships trading on that coast, too deeply laden or flying light, are not so well found as the large sea-going ships that go down the channel and have large harbours prepared for them. The coast too is nearly iron-bound: from the Fern Islands to Whitby it is deeply embayed, and beyond that it is almost a straight line. On the whole of that coast, from the Humber to the Frith of Forth, there is not a single harbour to which ships can run for shelter in a gale of wind. Much has been done at the Tyne, the Wear, and at Hartlepool to improve the docks and approaches to them, and too much cannot be said of the public spirit evinced by the local authorities of those large and important ports in what they have done and the large sums they have expended; and even smaller places like Berwick have been doing the same thing. All these harbours, however, are tidal, and their entrances are barred at low water. A glance at the wreck-chart shows the vast number of wrecks that have occurred along that coast; and when it is stated that in three years, from 1854 to 1857, 109 lives were lost, and property to the amount of £110,000, was sacrificed in *two* gales only on that coast, what more need be said to show the necessity, in a commercial and philanthropic point of view, for the necessity for some port to which vessels might run at all times of tide. Lord Claud Hamilton has on several occasions brought this matter before the House of Commons; and reading his speeches, and also the Reports of Commissions that have been held, and of Committees of the House of Commons, it is a wonder to this day why the question has been shelved so long. Objections have been raised—it is very curious to say, principally by shipowners themselves—against the establishment of any harbours of refuge on that coast at all, on the principle, they say, that the masters of their vessels would rather run into the ports than keep the sea, and also that their ships are so well found that there is no necessity for the harbours of refuge at all. I think Mr. Plimsoll has shown that that argument will hardly hold ground. There is no doubt the ships owned by the large shipowners of England are as well found as ships can possibly be, but even the best found ship is liable to accidents, and requires sometimes to run for shelter; and one might as well say that no hospitals should be provided for accidents, because a man ought to take so much care of himself that he should not get his leg broken by a cab running over him. It is no use entering into the different claims of various localities that have been recommended by different people, whether Redcar, Hartlepool, or Filey Bay is the best position. Filey Bay has most evidence in favour of its capabilities. It was the

spot recommended by the Royal Commission of 1859; and when it is known that Sir James Hope was the Chairman of that Commission, and that two naval Officers, two Officers of Engineers, Sir John Coode, C.E., and Mr. Lindsay, the ship-owner, were the people who recommended it, there can be but little doubt that it is the best place that could be chosen. In fact, to sum up in the words of Sir John Coode, it would have not less than 200 acres having 5 fathoms depth of water and upwards, at low spring tides, sheltered from every gale, and fit for the reception of the largest class of ships in the Navy; 403 acres with 2½ fathoms of water, that will hold all colliers and coasters; and besides, there is a considerable amount of space sheltered from all prevailing gales. I may add that a model of that harbour is exhibited at South Kensington showing the exact space that will be available. There is ample depth of water for vessels of any size up to the largest class of vessels in Her Majesty's Navy; holding ground which is rarely equalled and cannot be surpassed; entire freedom from all banks and shoals; absence from all tendency to deposit; an abundant supply of fresh water of excellent quality; and stone of a suitable quality for a breakwater in the cliffs immediately adjoining. And with regard to its position for offensive and defensive purposes, a glance at the map shows how admirably situated it is with reference to any invading force issuing from the Elbe or from the Baltic. All that has been said with reference to the advantages of Dover, Portsmouth, and Plymouth applies equally to Filey. I do not say that as having any more interest in it than in any other place on the north-east coast, but it is the place recommended by the Commission. It is on the most salient point along the whole coast. They say that harbours of refuge perhaps are better on a bight than on a salient point; still this has the advantage of both. It is six miles from Flamborough Head, which is the point of departure for all ships going to the Baltic, and it is admirably situated as a place from which a fleet stationed there would flank both the coast north and south from the Forth to the Humber. It is about half way between the Frith of Forth and the Thames. There is nothing from Yarmouth Downs or from the Humber to the Frith of Forth where any fleet could take refuge; and I think strategically this is a most important point, and one that ought to be carefully considered. Now Government are going to expend, as I understand, a large sum of money in making a harbour of refuge at Dover. The south coast have Portsmouth, Plymouth, and the Downs, and I think certainly the north-east coast has a prior claim, not only commercially and philanthropically, but also economically. One word about the cost of a harbour at Filey Bay. The Report of Sir John Coode states that it could be done for £860,000. I believe that it might be done for much less. Of course it may be rather presumptuous in me to say so, but I may mention that it is exactly the sort of work upon which convicts can be most advantageously employed. Any one who has seen the work that has been done by convicts at Portland in making the Breakwater and excavating those immense quarries which have formed the ditches of that impregnable fortress at the Verne, will know that the work of excavating and throwing the stone, as it were, into the water, is work exactly suited for them. The stone from the point at Filey is particularly suitable for the construction of that breakwater, and I consider that that work is much more appropriate for the employment of convicts than building prisons or raising fortifications. Both of these require rather skilled labour, and although that skilled labour may be obtained to some degree amongst prisoners, still I think the main element of the working power of convicts is brute force, and that brute force can be more advantageously employed in excavating stone and throwing it into the sea to make that breakwater which I consider of so much use. Doubts have been thrown upon the comparative economy of convict and free labour, but these doubts have arisen principally from civil engineers who have found themselves hampered in fact by the restrictions necessary for discipline amongst the convicts, and also from the difficulty of combining contractor's work with free labour. But now that there is an Engineer Officer of great experience at the head of the convict establishment, I see no reason for the employment of any civil element at all. Let the Government hand the work over to Colonel Du Cane, and give him such assistance from his own corps as he might require to work under him, and I feel convinced that instead of £800,000, little more than half that

sum will be required. Of course that is a matter we cannot go into. I think commercially, philanthropically, and from a strategical point of view, a harbour of refuge on the north-east coast is one that ought to be taken in hand at once, certainly before the one at Dover that the Government intends to take in hand. Filey is close to the districts where we get our coal and iron; it has railway communication at hand; and if that tactical station which I hear is going to be built in the north was placed in connection with it, you would have that combination of naval and military defence for the north part of our country which is most desirable.

Captain ROSEASON, R.N. : I was not prepared when Colonel Crossman rose, to make any speech relative to the harbour at Dover, except in relation to the paper before us; but as he has shown the merits of Filey, I am bound in duty to show the merits of my own child. I did not expect to succeed with the Government by the weight of any such arguments as Colonel Crossman has adduced in support of his own scheme. When I pressed my views on the Government, I stated the fact that Dover was a town with 26,000 inhabitants; that it had a harbour there of 27 acres; that two railway companies had expended £36,000,000 on their lines to Dover; that Government had invested millions of money on the fortifications, and that there was already barrack accommodation for 10,000 men. I argued that the port at Dover was in connection with many of our great arsenals, and that a minimum sum of money was necessary to make the whole perfect. I pointed out to the Government that they had already invested £750,000 on the pier, and that in consequence of not making a harbour, but only a pier, they lost the interest on the capital invested, calculating the money already expended at compound interest on the pier at £1,130,000, they had thus practically lost in interest £380,000 through not making a harbour, and that that would go on in perpetuity, unless they enclosed the bay and so realised an income to the port of Dover. I proved clearly before the Government that the passengers alone between Ostend and Calais would give £11,000 a year at a shilling a head, the sum named by Mr. Lowe in the Bill now before Parliament, and that sum is equal, within £5,000 a year, to the whole revenues of the Harbour Board at the present moment. Much as I should wish to see a harbour at Filey at a future day, I agreed with Mr. Clivechester Fortescue in his reply to Lord Claud Hamilton, when he said that he would create no new port, unless it could be proved that it was essentially necessary for offensive and defensive warfare. Therefore the time to think about Filey will be when we see any of our northern friends developing themselves so greatly that we may begin to fear them as a maritime nation. Till then we are to look to other quarters as a means of defence. I am happy to say, the Commanding Engineer who was at the port of Dover, whom I consulted on this measure, was my gallant friend who has just sat down. It was he who gave me support—he who urged me to write the letters in the daily journals—he who pressed me to publish the pamphlets which I laid before the Government; it was he who supplied me with all the drawings necessary to enable me to do so, and if success has attended my efforts, it is mainly due to the able assistance I received at his hands. I can further say, that the gentleman who was to have sat in the Chair which you, Sir, now occupy, Colonel Jervois, has been from first to last the warmest advocate of the complete utilization of Dover. It was he who declared that Dover would be to this country what Metz, Strasbourg, Mayence, Cologne, and other forts are to Germany; I might say more, for none of those garrisons have such a flow of commerce to protect, as my friend has shown here. It is for the protection of this great commerce coming from England down the Channel that the harbour of Dover will be so essential. I do not advocate the port of Dover for defensive warfare alone, but for offensive warfare, and with your permission I will now read those notes which I intended to confine myself to, had not some allusion been made to another port, and had it not been said that the money could there have been expended with more advantage to the country, than at Dover. I cannot fail to admire the practical nature of the paper we are called upon to discuss, and I consider its appearance most opportune at the present moment. The Lecturer has dwelt forcibly on the arrangements necessary to be made for the more perfect utilization of our forces, both by sea and land. He very judiciously divides his subject under three several heads—1st. Defence of our Shores. 2nd. The Protection of our Commerce. 3rd. The Invasion of an Enemy's Country. He first directs

our attention to the necessity of placing all our ports, especially those facing the British Channel, in a complete state of defence, so that they may serve as harbours of refuge for our mercantile marine whilst moving up and down Channel against the attacks of an enemy, and he observes that well fortified coal depôts will be the natural bases of our operations during war. It must be evident from our greatly expanding commerce, and the value of time in all mercantile transactions, that our old system of convoys must fall into disuse. Moreover there is little doubt, that in the event of war, or in anticipation of any such event, the shipowners and the merchants of England will quickly perceive the increased safety of steamers, as they will be detained so much less time in the vicinity of danger, and at all times be far more likely to escape from the pursuit of an enemy. The lecturer has also pointed out that if these fortified coal depôts at home constitute important centres for operations and secure harbours of refuge for our mercantile marine during war, so also in an equally important degree do our fortified colonial possessions in every quarter of the globe greatly add to our maritime supremacy. A glance at the strategical map published in the Journal of this Institution in May, 1870, proves that these ports give us the most complete control over the outlets and currents of commerce, and yet there are parties who cannot be made to recognise these facts or to perceive that the complete utilisation of our steam marine depends on the position and efficiency of our coal depôts. General Collinson is not one of those who let such advantages pass unnoticed, for in this paper he states—"The completion of the Harbour of Refuge at Dover would provide such a central position, fulfilling in all respects the requirements of a strategic harbour, and situated in one of those positions marked by "nature for the command of the sea traffic." It must be a solid satisfaction for him, entertaining such views, to know that the Bill for the construction of that harbour has passed the second reading in the House of Commons, is now in Committee, and the works will, I trust before long, be commenced. Having directed our attention to the sound policy of placing our ports in the Channel in as complete a state of defence as possible to enable us to set free for operations on an enemy's coast the largest number of both ships and men possible, I observe that he entertains, like myself, the notion that all future wars must be combined operations, that a purely naval war would be interminable and enormously costly; that a military force of considerable magnitude ought always to be held in readiness to act with the Navy, and that no port in England can offer such facilities for the rapid embarkation of our forces and military stores as the contemplated new harbour at Dover. It must not be lost sight of in the consideration of this subject that the success of such operations will mainly depend on the rapidity of our movements, and that these operations can be calculated at the present day by sea with far more accuracy than movements by land when great distances are contemplated. General Collinson states, with both truth and force, that "Naval operations will henceforth have their advantages over "land operations; they will be more secret, certain, and expeditious; they may "cover a large area of action, and the plans can be more easily changed." Moreover, an Army acting with an efficient steam fleet can never be deprived of its base of operations, for its base of operations will travel with it, that is to say, all its munitions of war and provisions. There will, therefore, be no such long line of communications to be kept up and protected as by land. Whole fleets of transports of a size even larger than the "Himalaya" have been called into existence since the opening of the Isthmus of Suez; therefore we can now transport with increased facility any amount of men and animals with both speed and economy. Two or three different modes of conducting such warfare will have to be carefully considered according to the exigencies of the service, and may be classed as follows:—First, the invasion of an enemy's country by small detached forces, termed by me flying armies. Secondly, with *corps d'armée* acting in conjunction with allies in an enemy's country, although possibly not from the same base. Thirdly, when taking the field in defence of the territory of an ally. When we only reflect upon the fact that this nation possesses capital, labour-saving machinery, and all naval and military resources greater than any two or even three nations in the world; that we are nearly the sole possessors of the most rapid and economical mode of transit to all quarters of the globe, viz., water; that the population of this vast empire, including India and our colonies, numbers 235,000,000 of souls; that the physical strength of

the British empire is more than doubled through the agency of machinery, it must be conceded that we are a long way from being *effaced*, and have not yet ceased, I imagine, to be estimated amongst the military forces of Europe.

Sir JOHN COODE, C.F.: Colonel Crossinan has pretty well anticipated what I had to say, more particularly with reference to the harbour at Filey and the north-east coast; he has given you almost word for word a memorandum I lately framed in connection with that model to which he has referred, and which is now to be seen in the International Exhibition. With regard to the strategical position of Portland, I may mention a fact which may be of some interest in this Institution. It is so peculiarly placed with reference to Alderney and Cherbourg, that on one occasion—certainly on one occasion only—I was able to see Alderney from the top of Portland; and on another occasion, under very favourable circumstances, when very little air was moving from the south-east on a warm August day, upon the breakwater at Portland, I heard the guns at Cherbourg. These are facts which I think may be of some little interest, as showing the strategic importance of that great harbour. With regard to the supply of coal referred to by General Collinson, I may mention that there is stowage room at Portland for no less than 5,000 tons of steam coal, and has been provided for a number of years past. That harbour, I think, fulfils all the conditions which he mentions with reference to speedy coaling; it is very large, the water is deep, and it is sheltered, and there are a great number of the old mortar boats that were built for the Crimean War, which are now made use of, and very admirably they serve, for the purpose of coaling Her Majesty's ships. With reference to the proposed harbour at Filey, I do not think myself that the value of the position of Filey can be over-estimated.

Admiral Sir BARTHOLOMEW SULLIVAN: As one of the Royal Commissioners on Harbours, and as having had charge of the Harbour Department of the Board of Trade for some years, I am anxious to give an opinion on this point. I came here purposely (fearing no one else might have come), to say a word for Filey. I was one who cordially joined in recommending Filey, not only as the best harbour of refuge for the east coast, but as the only possible one at a moderate cost, and as the only possible one for a coaling station for our fleets in war. If it was important then, how much more important is it now, since a German Navy is springing up right opposite to it, and we have the possibility, at no distant day it may be, of seeing a European coalition in the north, acting against us. I have a horror of any war, and I trust that no war would ever break out between us and any Continental nation, but that ought not to prevent us making the country as secure as possible, and that will be the best preventive of war. Now it has been pointed out to you, what an immense extent of country there is on the east coast without the means of coaling our fleet. Between Sheerness and the Frith of Forth there is literally no place. At Filey we are just half way, just abreast of the German port, which you see marked in the east corner, and you could not fix on a better spot for a position for our fleet, independent of its local advantages. It has local advantages such as no other place on the coast has for making a harbour except Portland. It is a singular fact, which Sir John Coode will bear me out in, that the geological formations of Portland are exactly the same as those at Filey, only reversed. The secondary formations run in a north-east direction from Portland, and end in Filey Bay, as though the two places were made for the same purpose. I believe I am right in saying that the Kimmeridge clay forms the bed of both harbours, so that the holding ground is excellent. Filey is within reach, by numerous lines, of all our coal fields, and it affords just the facilities for protecting a coal dépôt that one gentleman has so well pointed out as a necessary part of a naval harbour. The coal need not even be put afloat. I believe it would be possible to bring the train down a line of jetties, carried far enough out in some place for our large ships to come alongside. If so, the coal could be kept a little in land, out of the way of any enemy's guns, or of any one reaching it, and could be run down on the jetties when the ships want it. I will mention one point in connection with Filey which should not be overlooked. We did not look to Filey being a large naval port when we recommended it, and I think the altered state of affairs in Europe would justify a rather larger harbour being made, than we recommended. I would carry the breakwater out into one fathom deeper water. I think £1,000,000 spent on such a work as that would well repay

us, and then we should have plenty of room under that breakwater for our largest fleet, and could leave all the shallower part of the harbour for our wind-bound and refuge vessels. The rock lays there already for the work. Filey has facilities for construction such as we find at no other port, and there is no place that can compete with it as a point for the refuge of our coal trade. That was clearly brought before us by evidence taken in all the northern ports. And I may mention one fact, that while everybody said their own port was the best, they all said that the second best was Filey. That is, I think, conclusive. As attempts have been made in Parliament by men in high position to throw doubts on the estimates of the Royal Commissioners, and to accuse them of not having gone carefully into them, so that probably the work would cost two millions instead of one, I feel it right to say, there are not the slightest grounds for such an accusation. The estimate was calculated on the ACTUAL COST of Portland breakwater; and its correctness was proved by the fact, that Messrs. Rigby, the contractors for Holyhead Harbour, authorised me to say they had gone carefully into the plan on the spot, and were ready to construct the harbour at Filey for the estimated sum, giving guarantees for its completion. I do not think that the Lecturer need have apologised for not being a nautical man. There are very few nautical men who would not say that he has put the whole question before you as well as any nautical man could have done. There is much in what he has said that is as important as anything that can be brought before the country in this day. With regard to Dover. I believe a fine harbour at Dover may be very valuable, but I would not estimate it as of the same value as one at Filey. When you have three fine ports in the south opposite France, and you have none opposite the northern nations, then I do say that one harbour on the east coast would at present be of more value to us than Dover would. I am not an alarmist: I am not one of those who, like the writer of a well-known pamphlet not long ago, supposed that a German Fleet is going to eat up our Fleet and then invade the country. I think anyone who has gone fully and fairly into the nautical question would have said (what might be the case) that England's Fleet might be drawn away by distant wars, such as in America, and so leave the country with a small fleet, and then the danger might come; but to leave us our whole Fleet and to have it destroyed by a German Fleet was, I think, really trifling with the matter and undoing the value of what was written. That is my own estimate of it. I wish to advert to one point of the subject which is very important. You have heard a good deal about the advantage of having points in different parts of the world for the protection of our trade. I have tried hard for a long time to get a little notice paid to what I believe to be one of the most important of our foreign points of that kind. If you will look at the end of South America, where a very large traffic comes round, you will see a little group of islands called the Falklands. Now the whole of our rich Australian gold trade as long as it comes in sailing ships will come round that point. It is a fact that when there was a prospect of war, that point was fixed on immediately as the place to which these valuable ships should come and meet convoy; yet the beautifully secure harbour, where all the trade from Australia might go, is so undefended, that a single corvette of any enemy could go in there and destroy the whole of the ships when they were there, and all the place too, and burn it all down, for the want of some half-dozen good guns in little forts on the hills which command the harbour in every direction. This is risking a point which one day may be very valuable to us to protect our Australian trade homeward bound. A few guns and a couple of hundred of men in garrison, with Volunteers furnished by the Colonists, would be all that would be required to make a safe place for our ships to call at. There is one thing that we must not overlook with reference to the question of invasion. All the writers on the question of invasion that I have seen, have made much too light of the difficulty of throwing a large army on an enemy's coast. Those who served in the Crimea know that it took two days *unopposed* for the large fleets of England and France to land 50,000 men. I do not think that that has ever been properly estimated in considering the chance of invasion. But if our fleets were drawn away it is a danger of course, and I should look to this as the principal thing, not only for the defence of the country, but for keeping peace and making it too great a hazard for any nation to attack us, viz., to make London secure against attack. When our ports were equally exposed with London there was the chance of

Plymouth or Portsmouth being made a dash at and destroyed in a fortnight perhaps by an invading force, but now they are made secure, it is certain that no enemy, particularly from the south, will do anything but try to make a dash on London. You have made this the more certain by finishing your arsenals, and therefore what we want now to make invasion almost too hazardous to attempt, is a good system of encircling London with forts, in which the irregular forces of the country should assemble, so as to leave our own regular Army to work before the enemy in the field.

Sir JOHN COODE: Admiral Sullivan has appealed to me in support of some remarks that he made. He said the conditions at Portland and at Filey were reversed. What he meant, no doubt, was this—that Portland and Filey are at the two extreme ends of the great chalk range of Great Britain, and that you have in Portland Bay the tenacious blue clay called locally the Kimmeridge, from the village of Kimmeridge, and at Filey you have the Speaton clay, which is a local name from the village of Speaton. This clay is of a remarkably tenacious character, and a better anchoring ground I do not know. A model has been referred to this evening. I may say that my views entirely accord with those of Admiral Sullivan. I furnished the lines of the works on that model, and Admiral Sullivan will find it is larger and more comprehensive than the design recommended by our Harbour of Refuge Commission in 1859, and that it does go into a fathom and a-half or nearly two fathoms deeper water.

The discussion was then adjourned to Monday, the 27th inst.

ADJOURNED DISCUSSION.

Monday Evening, April 27, 1874.

COL. W. F. DRUMMOND JERVOIS, C.B., R.E., Deputy-Director
of Works for Fortifications, in the Chair.

Major EDWARD HARDING STEWARD, R.E.: Having been instrumental in moving the adjournment last Monday, it falls to my lot to make a few remarks upon the very excellent lecture given by General Collinson, a lecture which was listened to with the very deepest attention. In order to have a good discussion, it is absolutely necessary that there should be a good difference of opinion. I feel in this case—certainly on my part—that there are very few differences of opinion with the Lecturer, I can therefore only enlarge on two or three points that he has named. General Collinson remarked on the necessity of securing the basis of naval operations, in order that in time of hostilities a war of offence may be undertaken. This was fully explained, and after alluding to our imperial duties in a war in which this country might be involved, the Lecturer truly observed that the number of ironclads available for home defence would not be “over large.” Now, the revelation recently made in another place respecting the number of efficient ironclad ships, causes this subject to assume an unusual importance. It would be interesting if General Collinson, or some naval officer who may have studied imperial war policy would state the number at which he would place the seagoing ironclad ships available for home defence, supposing that proper provision is made for the requirements of the Mediterranean and North American stations, and the greater ocean highways. The number would be small, so small as to disconcert those who appear to expect the British fleet to be ubiquitous during a time of hostilities. It will even disconcert those who, looking only to home defence, expect the fleet to be always in the *right place* at the *right moment*. A great deal has been made in the lecture on the subject of the defence of our now very greatly increased commerce, for we may depend upon it, the mistake made by the French during the war in the early part of the century, of giving us the opportunity of defeating them *en bloc*, will not be repeated. The plan adopted will rather be the harrying of our coast and of our commerce by any nation,

or combination of nations, with whom we may be at war. With regard to our coasts, as was explained in the lecture, the securing of the doors of the stable is the precaution one would naturally take, and then the making of some dashing bold strokes against the shores of our enemy would be the next move—bold strokes, that would cause him to look at home, or at least to distract his attention. Unfortunately for us, this last *cannot* be done without the other. We must secure absolutely the defence of our country at home before we can do all these kind of things. A distinguished naval Officer, Sir Bartholomew Sullivan, who warmly advocated last Monday the claims of Fife Harbour, and who has studied imperial war policy a great deal, thoroughly appreciated the advantages that would accrue in war from freedom of apprehension as to our safety at home in giving scope to our offensive moves; he even urged the protection of the Metropolis. This precaution would undoubtedly set free a large portion of our force, and enable England to carry the war away from our coasts, a point so ably advocated by General Collinson. There is no greater mistake, I believe, than to have a war at home. The economy attending the adoption of a defensive war-policy was also dwelt upon. Now, if we were to adopt a defensive policy, it would be very difficult on our part to bring a war to a conclusion, and while the war would be languishing, what is to become of our commerce, our commerce which, even under the most favourable circumstances during war, could not be on the extensive scale usual in time of peace. One may well say that commerce is to England what the circulation is to the human body; and that though a feeble and restricted circulation may be supportable for a time, it subsequently leaves its mark. Restriction in commerce, extending over a year or so, would mean to us the loss of very many millions, by the side of which our naval and military expenditure may well be represented by the traditional flea-bite. Being on the subject of economy, I would suggest that anyone who is fond of statistics might find it very profitable to compare the loss to the nation at large occasioned even by a small panic on 'Change with the cost of placing ourselves in a position to disregard the fluctuations in the European political barometer. It may at first appear a small thing to us who do not very often have much money invested in business, but it would follow from our reflections that preparation for war is the cheapest course in the end; and if war be inevitable, a quick and decisive war, one which we can remove far from our own shore will be the least onerous to us. General Collinson has well described the increased interest now taken in military subjects. The interest is now much increased as compared with that of a few years back. But interest *does not* always imply a corresponding amount of knowledge, at least with the thinking portion of the public. Now, I may say that one of the disadvantages of a popular form of government, in a military sense, is, that great and most necessary measures of expansion can only be undertaken when fully supported by the public. The education of the public on points connected with war is difficult in the extreme. Lectures rarely meet more than a few strata, and moreover the lessons of war experienced by our neighbours only produce in this country unpleasant feelings, which last for a time, and then speedily fade away. The press, the great instructor in other matters, cannot be always depended on in this case, at least, to judge by some remarks made by a leading journal a little time back. According to the war-policy then enunciated, we appear to have to defend a country co-extensive with the old Heptarchy, and not the British Empire as we now know it. The whole lecture was, I take it, a protest against this narrow view of our war-policy, I therefore trust that it may have the widest circulation, and that the hint General Collinson gave, that the details of joint naval and military expeditions should be worked out in time of peace—that is, that we should apply to naval operations the well known Prussian War Office system—may bear fruit.

The CHAIRMAN: We should be much obliged to Mr. Reed if he will favour us with any remarks he may have to make upon any of the matters which are referred to in General Collinson's paper.

Mr. E. J. REED, C.B., M.P.: Mr. Chairman and Gentlemen,—I am very sorry to have to pay you and the author of the paper the poor compliment of speaking to it without a more serious study of it than I have been able to give. But one thing struck me on the perusal of the paper, that is, that General Collinson has taken a very broad and a very serious view of our responsibilities, with reference both to

our home defence and to our interests abroad, and in obedience to the invitation which you have given me, I will venture to add a few observations upon the subject as the result of long consideration. The last speaker has referred to the effect of popular government upon these questions, and I think we may take it for granted that the influence is a very restraining one. But it is becoming so general, that we may almost now, I think, leave it out of consideration. I do not know of any great European Power which has the means of conducting its naval and military operations, or even of regulating its naval and military forces, without reference to the popular will. We have lately seen in Germany how serious a question arose between the Government and the representatives of the people, even when the Government desired to give an answer in substance to the seven years' tenure of office by the French President, and which almost resulted in a serious national difficulty. And even in Russia, where the Government is more personal, and has more power than in any other country in Europe, we all know the Government is much restrained, not exactly by the organised representation of public opinion, but by the existence of public opinion, and by its expression in the Press and otherwise. We may take for granted, whatever the disadvantages may be in this country, they are pretty common, or are becoming pretty common to other countries of Europe; the disadvantages we experience are either experienced by other Powers, or are rapidly becoming so, and, as Major Steward has well observed, and as General Collinson indicated, it is very desirable to educate the people in these matters, and as he also showed, they are exhibiting a great desire to become educated, for they take the greatest interest in naval and military questions now. In fact, I doubt whether even the financial proposals of the Chancellor of the Exchequer, with an enormous surplus to distribute, have excited the same interest in our Parliament this year as the mere suggestion that our Navy was weaker than we thought. Now, Sir, it seems to me that we must take it for granted that under a popular Government we shall be limited in the amount of money we can appropriate to the public services, the Army and Navy. After some official experience, I am bound to say, that in my opinion, it is neither the necessities of the Army nor the necessities of the Navy that regulate the expenditure upon the Army and Navy; it is the amount which it is convenient in the view of public and political feeling, to appropriate to these services, that these services get; and we saw, even this year, that when the Minister for the Navy was disposed to draw rather a highly-coloured picture of our condition in an unfavourable sense, we very soon had another Minister telling us that, after all, the Government saw no occasion for doing much, and did not think much was necessary; showing to us that it is not the state or the requirements of the service that regulate the expenditure upon it so much as the public and political necessities and circumstances of the time. It is useless to find fault with this; all Ministers are alike, and all Governments are alike; they all find fault with one another because this is the case, but they all practise the very same thing when they become responsible. Therefore we must take it for granted that it is our normal position, and we must endeavour to do the best we can under it.

I am one of those persons who believe that the defence of our coast should, in a very large degree, be assigned to permanent military constructions, and to volunteer naval artillery forces, and I believe if we would put a little more thought and a little more serious organisation into the question of coast defence, we might defend our coasts in an infinitely better manner than they are defended at present, with a very moderate increase of expenditure indeed. It will, for instance, be admitted I believe, by naval and military Officers alike, that it would be a most valuable element of coast defence that we should be able to send a number of large guns in very small vessels out of the various great ports of the country. People talk about sending very large guns to sea, for ocean purposes, in very fast and very small ships. In proposing that they dream, because you cannot get a very small sea-going ship to go very fast even without a big gun, and with it, it is an absolute impossibility. I for one would certainly advise the direction of the thoughts of naval architects to the continual improvement of our position in this respect—to sending to sea the biggest guns in the smallest ships, and with the highest speed we can. At the same time, it is useless to suppose that in sea-going vessels we can—at any rate for a long time to come—do any very great things in that way. But to send small vessels

carrying large guns out of our ports for the defence of our ports is precisely what we can do, because there we do not want any great speed, and we do not want any great coal-carrying power. Therefore it is quite easy for us, if we have the wisdom and the will, to send out of our ports big guns in little boats, and Mr. Rendell, of Messrs. Armstrong's firm, and my friend on my left, Major Moncrieff, have shown us, each in their respective manners, how this may be done. But I go on to say that it is a very foolish thing for Government to invest money in producing a multitude of these little vessels, and then to lay them by. In my opinion, what we ought to do is this: we ought to decide upon the vessel we require, we ought to produce those parts of the vessel and of the engines which we cannot produce quickly, and we ought to finish as many of the vessels as we want for training purposes. For instance, take the case of any port, supposing it shall be said that for the defence of the Humber we ought to send thirty of these powerful guns out in time of war, and when necessity required. Then I would say build a couple of the thirty vessels that you want, or three if you like, in which you can train your forces, which shall be chiefly volunteer. They have simply to drive the engines and work the gun, and there are abundance of men in the port of Hull to man the thirty vessels as volunteers. Of course you would give a certain infusion of regular forces among the volunteers, which is always desirable, because of the superior discipline and steadiness which you get from highly and permanently-trained forces. Well, then, I say, I would build two or three vessels essentially for training, and I would provide those parts, such as the forgings of the ship and engine, which you cannot produce quickly, for the remaining 28 vessels. Then if the probability of war approaches, I will venture to say in a fortnight, or, at the most, in three or four weeks, you might turn out the 30 vessels, and you would have already passed through the two or three finished boats, the number of trained men requisite to man the whole. By adopting a policy of that kind, in conjunction with our land fortifications, and our mid-water forts, and with other adjuncts, you might, in war time, make the whole coast of the country (without any large expenditure, and with a very wide use of your maritime population), bristle with big guns; and whatever opinions gentlemen may entertain about the essentials of coast defence, I think they will agree with me such a force as that cheaply obtained—for the guns would really be the principal expenditure in time of peace—would be a most valuable element of security to the coast of the country. Then the next thing is, we have our commerce, and we have our foreign possessions. Now I must say that I believe, notwithstanding the break down of the various attempts in past times to utilise the mercantile marine for military purposes, in these days of iron steamships we might, with a very moderate expenditure upon certain of our mail and other vessels, adapt them for the carriage of certain guns; and I believe I could point the Government at this moment to three or four companies existing, or in course of organisation, possessing ships faster than the great bulk of our men-of-war,—because they are much larger and speed is their first requirement,—in which, for a very small outlay, provision might be made for the reception of guns in time of war. But there again I am afraid the Officers of the Army, and particularly of the Arsenal of Woolwich, will think I am laying a heavy burden upon them in the way of manufacturing guns; should they, however, find it too great, we can find means of assisting them. Here again I say the guns and ammunition would be the principal things we should require, in order to turn our mercantile fleet, or certain portions of it, to very valuable use in time of war. If convoys were necessary for the proper carrying on of our mercantile operations in time of war, we might with a ship like the "Inconstant," or the "Shah," or the "Raleigh," at the head of half-a-dozen mercantile vessels armed with guns in the way I have suggested, have very powerful convoys, which no fast vessels sent out by a European or other Power could possibly oppose. We might thus, I believe, pursue our trade on the great lines of commerce in very considerable security. That sets the great bulk of our war fleet free to do what, in my humble judgment this country never ought to dream of foregoing the power to do, that is, of carrying war upon the coasts of those Powers which choose to make themselves our enemies. I am sorry to say, in my opinion, we very much underestimate the necessity of this country even for that purpose. Nothing is more common,—I have often heard it when I was not a member of the House of Commons, but when

I used to sit under the galleries as an official person, and listened to the wisdom that emanates from the members of that place,—I used to hear members rise and say: “The first thing it is our duty to do is to be as strong as all the other Powers of Europe put together in ironclads;” and I have known it to be stated lately, during the discussions that have occurred since the speech of the Minister last week, that our ironclad Navy really is after all, equal to all the other ironclad navies of Europe put together. I am as proud of our Navy perhaps as anybody, as I had a good deal to do with building it, but I think that is a very great overrating of our Navy; and I think you would find it so if you brought it to this simple test. What has our Navy cost? and what have other Powers expended on their navies put together? I do not understand that the English people or Government have any right to assume that our ships are designed or built with any great superiority to other ships. I know very well during the seven years I was the chief designer of Her Majesty’s ships, that I never discovered, from the Government or the country, that I was deemed a marvellously skilful and deserving naval architect, or that I had done a great deal for the country more than all the other naval architects of Europe. If that was so, it was left for me to find it out in some other way; but I dare say the general opinion was not to that effect, and it is fair to assume, making allowance for a little pardonable national pride, that on the whole, considering the extent to which other Governments have built in this country, considering the close imitation which they adopt of our methods, and considering the skill and genius which they themselves bring to bear upon the subject, we may take it for granted the country ought to be satisfied with regulating their power, and presuming other powers also to be regulated, by the expenditure upon new ironclad ships. Now, if this country imagines that it has spent upon ironclads as much as all the Powers of Europe put together, it is very much mistaken, and therefore I maintain that it is an abuse of national pride or national vanity to assume that we are so very strong. I think we are strong comparatively, for this reason, that for seven years at any rate we adopted this policy,—that whenever we laid down a first-class ship we made her superior, not in disputed points (because I see gentlemen around me who would dispute a great many of the features of the ships that I designed), but superior on points which are not liable to dispute: superior in thickness of armour, in weight of armament, in speed, and in other measurable and quantitative qualities to the ships that had gone before. I believe it would be an unfortunate thing for this country in these days to adopt any other principle than a determination to build the best and strongest vessels. I know there are many people, and I believe they are among the wisest of the wise, who say that this clinging to armour is a perfect delusion, because some day or other the gun will invariably beat it, and then where shall we be? Well, sir, I for my part never designed ships in a prophetic spirit, and I never want to build them in a prophetic spirit. I may claim, however, that we have been, ever since the introduction of armour plating into our Navy, strong, because we have adopted it, and strong because we have gone on with it; and although I believe as much as anybody that the day will come when we shall do away with it altogether, I think we should be in the highest degree unwise to do away with it at present. What is a ship without armour? It is a ship with her crew and armament sent to sea upon the top of a steam boiler and a powder magazine. I do not know that that is an unfair definition of an unarmoured ship, because you may make no account whatever of the mere envelope that encases the engines, boilers, magazines, and so forth; and for my part, if I had to fight an action to-morrow, I must confess I would very much rather fight it in the “Derastation,” with all her very great disadvantages, to fighting it in a ship which had a steam boiler and magazine underneath my feet, and nothing to protect them from the enemy’s fire. However, apart from this particular aspect of the question, I do maintain that our Navy is not a bit too strong to represent our power in the presence of possible combinations of other navies. As a matter of fact we often underrate the powers of other navies, and I say this knowing what I am saying. I know that in the autumn of 1872 I got into a little trouble for calling attention to the progress which other Powers were making and to the want of progress which we were exhibiting. I must say events have a little interfered with my views at that time, for this simple reason, that, through accidents and through other causes, foreign Governments have not made the degree

of progress which it was then fair and right to expect of them. Take that famous "Peter the Great," the name of which excites so much feeling in some persons' minds. I was told the other night by a gentleman who not long ago was a responsible Minister, that I really had so written about the "Peter the Great" as to make people imagine that she might turn up at any moment in any of our ports. Well, gentlemen, it is one thing to write a thing and it is another thing to read what somebody else has written. I can only say that if anybody would refer to what I wrote they will not find a syllable in my words to justify such an expectation. All I said was that the "Peter the Great" was under construction and making considerable progress, and I described what I had seen. The Russian Government have been very unfortunate in connection with this ship, inasmuch as in the autumn of last year two cargoes of her armour plates were sunk on the Dogger Bank. One ship went out from Hull with one cargo, and the plates got adrift inside of her, or something was wrong outside of her, and she went to the bottom with the plates. A week afterwards another ship did precisely the same thing, and you can easily imagine it is a little embarrassing to a Government to have its 14-inch armour plates sunk upon the Dogger Bank instead of being delivered at St. Petersburg. That has thrown "Peter the Great" back; and for my part I confess the effect of that has been to pass the "Peter the Great" out of the front rank of war ships and put her into the second rank. On account of the agitation some of us got up, we did induce the Government to make a little more progress than they were doing. However, it is well known to gentlemen that the Russian Government have not been slack; they have been making progress, and are not by any means to be despised as to their naval position. I do hope gentlemen will not reserve all their wisdom on this subject until after the event, but will remember the Russian Government are building vessels which are capable of resisting our heavy ordnance and of carrying still heavier. The German Government has not made the progress with its ships that I expected,—from various causes connected with men and connected with the want of general means to advance these constructions with the rapidity which we are accustomed to in this country; and I must in fairness add, partly owing to the slow progress of their ships in this country. But making all kinds of allowances for these things, I maintain no man competent to deal with this question can sit down and make an impartial review of the naval forces of Europe generally, and say that we are in a pre-eminently satisfactory position, either at the present moment or looking a little to the future; and, if that be so—if it be necessary, as I believe it to be, to throw more expenditure upon our sea-going fleet, then I must say the inference I drew that we ought to defend our coasts as much as possible by these secondary and auxiliary arrangements, stands more confirmed than ever.

I am afraid these remarks are not as pertinent to the paper as they might be, and I well know that there are parts of the paper to which I should have the greatest pleasure to refer, if I could do so at all worthily, but I cannot. I feel this point, however, very strongly, viz., that we ought not to be in a position to have to trust to taking from our seagoing fleet in any degree for the protection of our coasts in time of war. We want a squadron in the Mediterranean undoubtedly; we want a Channel squadron, and we ought to have a North Sea squadron in the event of any war whenever it may happen; because in these times, although you may go to war with one power, you may find yourself at war with two or three in a week's time, and, as gentlemen of this Institution know perfectly well, the developments of war, like the operations of war, may be extremely rapid. Therefore, we ought to be prepared.

I may say one thing with reference to this point that is quite pertinent, I hope, to this discussion; that is, the assumption that the waste of the boilers of our iron-clad fleet is unexampled and unparalleled. Now, the first remark I would make upon that is this—that he would be a very improvident owner of a steam-ship who would take out the boiler of his ship the moment it ceased to be perfect, the moment it became incapable of carrying full steam; or, if not exactly incapable, yet when it ceased to be advisable to carry a full pressure of steam. Gentlemen will know perfectly well that in the case of a steam boiler, as in the case of a bridge, or any other construction, you always allow an enormous margin beyond what the thing has to bear, and what it is supposed to be capable of bearing. We test every steam boiler

far beyond the pressure that will come upon it, and much of the alleged incapability of the boilers to sustain the proper pressure is due to the simple fact that, after a certain amount of wear and tear, the professional gentlemen say, "Well, we advise a reduction of the steam pressure by a certain amount." The chances are that the boiler in which that reduction takes place would be capable of working even for years with the original pressure, if you choose to invade the margin of safety which it is deemed prudent to provide. I therefore would lay down the proposition that we ought not to say roundly and broadly that every boiler in a man-of-war which it is deemed imprudent to work up to the full pressure should be taken out of it. We should have to be a very rich country indeed to carry out that policy. There is one other proposition which I will put upon the other side, that is, that when you, from any cause whatever, wise or unwise, deem it desirable to reduce the pressure, so as to take away very largely from the steaming power of the ship at her best, then it is time to take her boilers out.

The CHAIRMAN: I am sure these observations are exceedingly interesting in themselves; but as the time of discussion is limited, I think I must ask Mr. Reed to keep to the point of the paper. The question before us is rather with reference to general considerations relating to the maritime power of the country. No doubt, incidentally, the question of the construction of ships and boilers, in which I feel myself greatly interested, is in some degree to the point, but I think we must apply some limit to the details in these minute particulars.

Mr. REED: I watched very closely the comments made upon the paper by the gentleman who preceded me, and I was watching still more closely the feeling of the audience, to see that I was not trespassing beyond their interest. After the suggestion which has been given me from the chair, however, as the Chairman must understand the object of the discussion and the temper of the audience so much better than I can possibly do, you will excuse me if I bring my remarks rather abruptly to an end, and content myself with the general observations in which I indulged, I may say by your invitation.

The CHAIRMAN: We have had the naval side of the question. Perhaps some gentleman may follow, taking up any views that he may like to express on the land view of the question.

General EARDLEY WILMOT, R.A., F.R.S.: I gladly rise on your invitation, because I differ from the two gentlemen who have preceded me on one very main element. They spoke of educating the people, but in my view it is not in cases of this sort the people that require educating, it is the Minister. When a Minister comes forward and states plainly what is required for national defence, the nation comes forward at once to do it, and I think it is very hard upon us who are the "people," that we should have to bear the blame of the alleged shortcomings of the Government. As regards the paper of General Collinson, I must, if he will permit me, add my testimony as far as I am a judge, to its extreme value and pertinence, for the question requires ventilation throughout the whole country. We want the people to understand that England is not the country. England, to my mind, is simply what Paris is to France—the capital, and nothing more. Our first duty is to make the capital secure, but if you make your capital secure and neglect all that surrounds you in your colonies, you are doing only half the work. As regards the necessities of ports, which is an essential element of General Collinson's paper, it seems to me it is not necessary for us to look along the coast to find existing ports, but necessary to determine the place where a port shall be, and considering the power, the skill, and wealth of the country, at that point where military and naval science says the port shall be, there it should be. From it to the great centre dépôts of coal and so forth, lines of railway should be laid down for the express purpose, if necessary, of supplying all that is required to those ports. In the defence of England as the capital, the notion put forth by Mr. Reed of the small vessels is a most important one. But I cannot forget also that as Paris has its great outworks around it, so in our island these great ironclads are our advanced forts, having the supreme advantage of not being fixed here and there, as they are round Paris, but being movable around our channels and capable of taking up a position of defence wherever they are required. As it is impossible to surround our coasts with permanent fortifications, we possess a supreme advantage in being an island in this respect, and are

more defensible than any capital like Paris. Further, in considering what should be the defence of the country, it is not necessary for us to enquire minutely as to what other nations can do, but simply to assume that they can do all we can do ourselves. If we assume, as we have every right to do, that they when combined can do what we can do, we have a standard, and we shall know exactly the proportion of defence we require against them, and until we are satisfied that we are in a proper state of defence, we shall not feel perfectly happy. With regard to depôts, it happens we have got our great depôts upon the coast. It is a very unfortunate thing that we have, for there is not the slightest reason why the great depôts of stores and so forth, considering the power of railways, should not be inland rather than on the coast.

Major MONCRIEFF, F.R.S.: To bring back for one moment the very important subject under discussion to the point it started from, namely, to the question of the formation of strategic harbours and depots on our coasts for supplementing our naval forces. The discussion to-night has been more directed to the Navy and the ships themselves, but I should say the question more immediately under consideration was how much of the resources of the country should be directed to increasing the ships and floating batteries, and how much to the harbours and depôts required to support these vessels in time of war. The great feature which must strike any one who glances at a map of England in relation to this subject, is the number of places which might be or are adapted for depôts and harbours on the south coast of England in comparison with the advantages of the east and north-east coast in this respect, which is comparatively unsupplied with proper harbours or depôts, either for mercantile or war purposes. It appeared to me the arguments adduced in favour of a harbour at Dover were very strong, so strong indeed that I felt prepared at once to endorse every opinion of the gallant Officer who adduced them (Captain Hoscason). When one casts one's eyes, however, to the north of the map, it struck me that the arguments in favour of the other positions were, if possible, even stronger, and if one could only carry the mind a little further north than *our* map goes, I believe this impression would be confirmed. I am sure that a great deal might be said for doing something for the only position in which vessels of war can at present take refuge between the Humber and the Moray Frith, a distance of about 400 statute miles. In that very extensive and important reach of coast, there is only one place where vessels of any kind can take refuge, namely, at St. Margaret's Hope, and some other anchorages further down the Firth of Forth. I happen to be well acquainted with that particular district, and I can say that nothing whatever has been done in the way of either forming what would be now considered proper war depôts, or protection for our own cruisers pursued by a stronger force. I think that good cause has been shown in General Collinson's most able paper, and in the discussion that something should now be done on the north-east coast both at Filey and the Firth of Forth. I should have felt inclined to offer some remarks on a part of the subject on which I am specially qualified to speak, and which remarks would have been directed towards urging for land service an analogous proposal to that of Mr. Reed's admirable one for gunboats and sea service, and on the same principle of expending money only on what takes a long time to create; but I think it right to refrain entirely from entering into any question that in relation to the subject before us would be one of detail.

Captain ARDAGH, R.E.: I desire to make a few remarks about Mr. Reed's suggestion for the provision of small gunboats in our ports, for their protection in time of war. Mr. Reed has stated—and no doubt he is the very best authority we can possibly have on the subject—that these small boats might be prepared in a month's time. I think a month would hardly be sufficient time to allow, and even assuming that it was, I think within a month the crisis would have passed. Over and above that, I am firmly convinced gunboats are certainly not the best method of disposing of our guns for the protection of particular ports. Our gunboats and our Fleet generally, we may assume as our active Army of the sea, which must be always on the move, and should aim at carrying war into the enemy's waters, and blockading his ports. What we have to do for the protection of our smaller ports, and even of the great commercial harbours and arsenals, is to provide security for fixed points; and for the protection of definite points, there is nothing so efficient and so econo-

mical as a gun fixed on shore, for these reasons—that it is always there; it cannot run away; a shot cannot sink it; a ram cannot penetrate it; a torpedo cannot blow it up; and it costs one-twentieth part of what the same gun would cost placed on board ship.

I observe, in reading General Collinson's paper, that a discussion took place with regard to the harbours at Dover and Fife. Dover Harbour, I understand, is about to be completed, but in respect to Fife (or, in more general terms, upon the desirability of a harbour on the east coast in which ironclads can coal) I hold very strong opinions indeed. We have now got, as Colonel Crossman very ably pointed out, no harbour whatever on the east coast, and we cannot pay too strong attention to the arguments which he brought forward to prove the need of one. Sir John Coode also pointed out the advantages of Fife; and the fact is, an armour-plated ship in a blockade of the northern coast of Europe, would now have to go to the Thames, or Harwich, or Dover to coal, for there is not a single harbour on the east coast to which armour-plated ships could safely resort; and even Dover at present is not in that position. With respect to the fitting out of those merchant vessels which Mr. Reed alluded to, there is a point which General Collinson has mentioned, namely, that one of the great naval powers of the world has not yet given her concurrence—nor is she at all likely to do so—to the general agreement against privateering. And I am very strongly inclined to think that in the event of a great war we should have to reconsider our position on that question. I do not know how we could manage it otherwise. We have all these merchant vessels available, but how are we to commission them? We cannot turn them all into ships of war. We could not provide naval officers to command them or enrolled seamen to man them, and it seems to me we have no other mode of getting out of the difficulty than that of giving letters of marque. It is a very serious question, and one which deserves consideration.

We have heard it stated here to-night that our vessels of war, our large ironclads are to be considered as our forts, and the smaller ones as the fixed defence of the coast. I do not agree with that idea. The ironclads must be considered as a mobile and an offensive force, and not an immovable and passive one; and if we want to defend our ports we must erect forts for their protection, and as incomparably the cheapest mode of doing it. It would be perfectly preposterous to employ an ironclad to defend a port when you could construct a fort at one-twentieth of the cost of the ironclad, and put one-sixth of the *personnel* into the fort to defend it.*

Mr. S. J. MACKIE, C.E. : I was struck with what I think is a very essential feature in General Collinson's paper, and that is, the provision which he deems necessary, other speakers concurring, for rendering the defence of our coasts effective, so as to liberate the Navy of this country for offensive warfare. I think, also, the strong position which Mr. Reed took with regard to the encouragement of the Volunteers, using them not only ashore but afloat for the defence of the country, is a very valuable one. One point which has been omitted seems to me to be an element of consideration, namely, the possibility of using our mercantile mariners and seafaring population with very great advantage, and in point of fact, organising the available resources of our shores by a volunteer naval force. I cannot say I agree in sending

* A few comparisons of what may be got for the same money in the way of ships and forts will be rather astounding:

The "Rupert," with 3 guns and 9-inch to 14-inch armour, cost as much as the Plymouth Breakwater Fort with 22 guns and armour from 15 to 20 inches thick; or as Hurst Castle Battery, a casemated work for 61 guns with 21 inch iron shields. The "Glatton," with 2 guns, cost more than Picklecombe Battery with 42, or Garrison Point with 36 guns, these works, too, being casemated with iron shields. For the cost of the "Devastation," mounting 4 guns, with 10-inch and 12-inch armour, seven earthen batteries, like that at Southsea, mounting 217 guns, could be constructed. In addition to the immensely greater first cost, the expense of ships of war is greatly enhanced by the annual expenditure in repairs, renewal, and risk, which, in the case of forts, is insignificant, and by the more numerous *personnel*; for it takes at least four times as many men per gun to man a ship as are needed in a land battery.—T. C. A.

a crowd of big guns to sea in small ships. I would much rather see the energy of a maritime population brought out by training and practice with such weapons as Harvey's torpedoes, which, I am sure, would prove to be exceedingly effective in the hands of skilful sailors. The use of such a weapon as this could not require naval Officers or naval seamen. I have myself been out with Mr. Harvey from Yarmouth in a common tug-boat, and have seen the master of that tug-boat most effectually strike with a dummy torpedo every vessel which came in sight. And I am sure a great deal might be done in this method. Steamers of high speed, armed with such weapons as the towing torpedo, might be left to take care of themselves. And if torpedo warfare is looked to thoroughly as a means of helping the mercantile Navy to help itself, it will be another essential element in carrying out General Collinson's main point, that the defences of the country be kept up effectively, so as to liberate the Navy for offensive purposes. No doubt it is along the Channel, in view of the possibility of having our nearest antagonist to deal with, that we require most defence, and from Land's End up to Harwich, or thereabouts, the main necessity exists for forts and also for coast vessels. The longer distances, I think, would be effectually taken care of by the Navy; but, in my estimation, the port of Dover demands the most earnest consideration, not only on account of its position, but also on account of its traffic, and its nearness to France.

Captain NEEDHAM, R.M.A., Assistant-Professor of Fortification, R.N. College, Greenwich: The third head under which General Collinson divided his subject was that of the invasion of the enemy's territory; and I think that he enunciated that for this purpose a military force of considerable magnitude should always be held in readiness to act with the Navy, and that harbours should be specially prepared to afford every facility for the embarkation of troops. But I think he scarcely mentioned, or at all events laid very light stress upon what would seem to be a third and most important element for the successful accomplishment of such combined operations, namely, the arrangements which must be made beforehand to ensure that there shall be at hand betimes a sufficient number of steam transports to embark without delay the expeditionary force of which he spoke, and such stores as must necessarily accompany it. No doubt in time almost any number of powerful and capacious steam ships could be gathered together, collected from our great ocean steam companies, from our mercantile ports, from the Thames, the Mersey, and the Clyde; but to get hold of these in the first place, to charter them, to make such arrangements as might be necessary to enable them to carry troops, would be a work of time. And I think that General Collinson laid down that the success of our operations would depend mainly on the rapidity of our movements. It is notorious that the Prussians deemed it necessary to have time-tables worked out for the calculation of their forces at any point, whence they may deem it necessary to concentrate them for defensive or offensive operations. And if "the sea is to become England's base of operations," it seems to me that we ought also to have arrangements made in time of peace to enable us to carry out with certainty and celerity the transport of our troops across it in time of war. It may be said that the Navy would be able to perform this task of conveying our troops; but I think naval Officers will adduce many excellent reasons against cumbering the decks of men-of-war with soldiers during time of war, and when there will be a possibility of encountering a hostile fleet. There remain our naval transports, but wars break out suddenly now-a-days, and if hostilities were to be unexpectedly declared during the relief season, a great number of our largest troop-ships would probably be at sea conveying regiments to and from India. Besides the Indian transports, I find only eight or nine troop-ships in the Navy lists. Many of these would probably also be absent, so that we might very possibly have only two or three troop-ships left for our immediate use. I think, after Colonel Chesney's lecture in this theatre the other day, the Duke of Cambridge made some remarks on the great difficulty attending the transport question. I think, therefore, in a discussion "on the strategic importance of our harbours both for defensive and offensive operations," the question of transport is one which merits consideration. If our transport arrangements are in such a state as to cause us to feel no uneasiness as to our ability to move large bodies of troops by sea, even if called upon to do so unexpectedly, I apologise for taking up your time by the few remarks I have made.

Colonel ALCOCK : In corroboration of what Captain Needham has said, it may be in the remembrance of some of the gentlemen here who were present during the discussion on the possibilities of an invasion, that one very important point brought forward was, that at Hamburg and Bremen there are numbers of magnificent steamers perfectly adapted to the very purpose of invasion, with an army at their back organised for that purpose.

General COLLINSON : The first thing I shall say, Sir, in reply, is to express my great gratification that this paper has produced such an interesting discussion. And I think I may congratulate this Institution that, although perhaps the number of speakers has been small compared with what the importance of the subject really demands, still the value of the individuals and of the expressions they have made use of is so great, that we may compare it to the fleets and guns we have been talking of, comparatively few in number but so powerful that I think they will go through the country with great effect. I should wish to recapitulate a little the questions I have put before the meeting, touching upon the different points that the different speakers have mentioned. First of all, I should like to say a word upon the subject that was raised at the last discussion—Filye Harbour. I did not wish to enter into any discussion upon any particular harbour, or to make any comparison between the merits of one harbour and another; but I should like, as the question was raised, just to say that I arrived at certain conclusions with respect to the advantages of Dover from strategic considerations entirely founded upon the importance of keeping our home fleet concentrated in war time. I do not undervalue at all the importance of having a harbour upon the north-east coast, not only for war purposes, but for the shelter of our commercial trade in time of peace. I confess I think it is perhaps more important in this latter respect than for war purposes, but I am quite prepared, as I said in my paper, to affirm that for coaling purposes in time of war for our war fleet, and for the shelter of our cruisers, it is absolutely necessary that we should have some harbour somewhere or another on that north-east coast. Captain Steward asked some question about the force of a navy that would probably be required. I am afraid I am not myself prepared to give any definite answer to that question; but we had, after he spoke, the very great authority of Mr. Reed, stating that the British fleet cannot be considered as being in a condition at the present to be a match for combinations that might be made between foreign fleets; and therefore that shows we must be prepared to supplement our fleet with other means of defence. I am very glad to have the high authority of Mr. Reed to confirm the general principles that I wish to lay down in my paper, viz., that it is most important that we should put the coast of England into as thorough a state of defence as possible by local means, whether by sea or by land. By local means, so as to free our great main forces for employment in the more important duty of attacking the enemy; and we must consider, as I said just now, that the British fleet is not so very much superior to other fleets in the world that we shall not be obliged to be very careful upon the subject of its disposition and management. I do not know that there is any other point raised by gentlemen who have spoken to-night that I wish to make any remarks upon, because they confirm generally my views, although, perhaps, upon certain points of detail we may not be agreed, still, upon the whole, they are so far in accord with them, that I think it will be felt by all people who read the paper and the discussion that there is an agreement between naval and military men about the importance of increasing the defences that we have been discussing to-night. In my paper, I purposely avoided going into details about the different harbours, first, because I did not think it right to discuss publicly the specialities of each of our military harbours, but mainly because I wanted to raise the subject which we had under discussion from a mere comparison of particular local questions to what I must consider as a higher sphere, the general disposition of our strategic positions upon the sea. That is a subject which I think now requires re-consideration, as General Wilmot has observed. The arguments for a fresh consideration are these:—First, that there has been an alteration in maritime warfare caused by steam, and, I may say, by iron; and, secondly, that there are new and peculiar advantages in war arising from these to England especially. The alterations which appear to me likely to arise in maritime warfare are that there would probably be an increase in the size of what I suppose we must still

call line-of-battle ships, and apparently, as a consequence of that, that there will probably be a decrease in their numbers, so that war fleets will tend more and more to become composed of a greater number of swift and unarmoured cruisers and a smaller number of very powerful ironclads. That gives rise incidentally to another question that I will not discuss, namely, the advisability of keeping these costly ironclads in reserve during peace, and using for ordinary purposes unarmoured vessels. Then again, this change of fleets, if it does occur at all, will occur more in foreign nations than in England, for this double reason, that foreign nations cannot afford so many costly ironclads, and that the vulnerable surface of England, as Captain Grivel, of the French navy aptly calls it, that is to say, our sea commerce, can best be attacked by cruisers. And then again, this same change in fleets would lead to strategical combinations of inferior fleets opposed to us in order to take at a disadvantage the superior fleet of England or to effect a landing on our territory; and steam, I consider, gives an advantage to the enemy in making such a combination. Then the great ironclads of England having so greatly an extended line of ocean to defend against this new power of attack, will also, no doubt, be more concentrated each in the scene of operations allotted to it, and hence the necessity of increasing the number of shelter harbours and coal depôts each in good strategical positions as bases or centres of the area of operation, and England being in respect of her commerce always on the defence, requires many such centres; while the enemy, being on the offensive, can choose his own line of attack and prepare accordingly. I wish to say a word on the subject of the plan of shelter harbours, as that question has also been touched upon; and I will repeat what I consider to be the indispensable requirements of a good military harbour in these days—that it should have smooth deep water alongside a wharf with security from an enemy, and that neither of these requisites can be obtained thoroughly without small openings. For smooth water a small opening is a necessity. For security against an attack by night, there is nothing like a material obstacle across the entrance. Though guns and torpedoes are powerful weapons, and are likely to be more powerful, I am still somewhat inclined to agree with Admiral Porter (I think it was), of the United States navy, that they cannot be depended upon for stopping a bold seaman. There is another advantage in having smooth water in a military harbour, that the vessels can be packed much closer. War vessels lying in an open harbour require some 20 acres to each vessel. If smooth water was certain inside the harbour, surely some arrangement could be possible to place quite effectively at least five times as many in the same space. But the great advantage of smooth water is the saving of time; and time, as I said before, will be the essence of naval operations in future. A sailing-vessel, refitting in an open harbour, is something like a coach changing horses at a road-side inn; a steamer loading at a wharf is like a train watering at a station. With respect to the new and special power which I consider is now placed in the hands of England, or, as I will express it in the more happy terms of Captain Hoscason, the proper utilisation of our land and sea forces, the making use of the extraordinary power we possess now of producing steamers, and the command we have on the sea to make our little army do the work of, and keep well employed, one of the large Continental armies properly employed, I believe this power would put England very much in the position of being the peace officer of the world; but, as Captain Needham has very properly said, to effect this, requires more elaborate arrangements, especially as regards transport. In thanking you for listening to my remarks, and thanking those gentlemen who have added so much to the interest of this discussion, I will express the hope that this subject will be again and again discussed here. For, as I said at the commencement of my paper, I believe the people of England are really becoming aroused to the perception that war is a matter that must be considered and prepared for, if we want peace; and I believe the discussions here are of very great assistance to the nation in arriving at opinions as to the proper preparations to make, and I feel sure that when the people of England have resolved to act in war-matters, the same ingenuity, skill, and energy that they have shown in gaining the splendid empire we possess, they will also show in maintaining its interests unimpaired against any enemy.

The CHAIRMAN: Gentlemen, I am quite sure that we all feel grateful to General Collinson for the admirable paper he has put before us. I cannot help expressing

in passing, my regret personally—and I am sure that all who know General Collinson and his abilities will join me in that regret—that we should lately have lost from the public service, by his retirement, an Officer who is capable of taking so broad a view as he does, of the requirements of the British Empire in matters relating to its defence. In addition to the very interesting observations of General Collinson in his paper, we have been favoured with many important observations by other gentlemen well capable of forming an opinion on the question before us.

Maritime warfare must necessarily first depend upon ships. We must have cruisers to protect the lines of commerce which you see depicted on this chart, and I look upon it as a very good suggestion of Mr. Reed, that the great ocean steamships on our lines of passenger traffic should be provided with the means of carrying guns, so that they might be armed with a small number of pieces of ordnance, and in conjunction with such vessels as the "Inconstant," might aid in convoying vessels on those lines of commerce. It is necessary, as has been pointed out by the Lecturer, that our ships should be provided with coaling stations at intervals upon the lines of transit, and these stations should certainly be protected against occupation or attack by an enemy's ships. As General Collinson justly observes, if we have coaling stations and do not protect them, we provide fuel for the enemy, as well as for ourselves; during the absence of our cruisers or squadrons, he would be able to help himself to our coal. It is therefore most important that not only Malta and Gibraltar, Halifax and Bermuda should be thoroughly protected, but that places like Port Royal in Jamaica, Simon's Bay at the Cape, some point in Ceylon, Aden, Bombay, Singapore, King George's Sound in Australia, and some other places, should be properly defended as coaling stations for the squadrons and cruisers which are to protect our commerce. For the defence of our shores at home, conveniently situated and well-defended harbours are necessary for sheltering and coaling our squadrons. These harbours, in fact, become foci of refuge and action for our fleet. Where nature has not provided such harbours, they should be constructed artificially. We have fine strategic harbours at Cork, Pembroke, Plymouth, Portland, and Portsmouth, and of these the harbours of Plymouth Sound and Portland are formed by artificial breakwaters. Dover is a half-completed artificial harbour, of which only one arm has as yet been constructed. It is a most important position for naval defence, and I should much like to see the harbour there completed. We have had a good deal of thought given in this discussion as to whether the harbour at Dover should be completed before Filey Bay is undertaken. The fact is, however, that we want harbours at both those points. Dover has naturally the priority of consideration, because of its importance for international communication. We have already fortified harbours on the southern coast, and we want to turn the corner, so we should like now to go on with Dover. Filey Bay, if funds will permit, may follow at some future day. With reference to Mr. Reed's observation as to the defence of the coast by means of volunteer artillery, I think that it is most important to apply the services of volunteer artillery to the manning of guns for the defence of our ports. The Volunteers should be told off, each body to its own particular harbour, or to its own part of the coast. We should then find that they would take great interest in the work they had to perform; and such an organisation would be most valuable for the defence of our coast. As regards his further proposal for the preparation of frames of gunboats, the suggestion is no doubt worthy of consideration; but it seems to me that the remark made by Captain Ardagh with reference to the defence of ports by means of land batteries, should be taken into consideration in conjunction with this proposal. In each case we must consider carefully whether the circumstances are such that we can best provide for the defence of our harbours and our coast by works and batteries on land, or by armed vessels afloat. I would not dogmatically lay down any rule that gunboats are better than fortifications, or that fortifications are better than gunboats. In some cases, one will be best, in some cases, the other; in some cases we require both. In some few cases, fortifications will not help us at all, and floating defences must be adopted. We should therefore consider carefully in what positions each element is required, and deal with the problem according to the merits of the case. There is one point especially referred to in General Collinson's paper, which I have not yet touched upon, that is, the question of our undertaking what is termed "offensive warfare." In the abstract,

there can be no doubt that it is a good principle to provide for defence by assuming the offensive; but I confess, when I know the difficulty of finding troops for the various duties our Army has to perform in different parts of the world, I do not think we can hope to put into the steam transports to which General Collinson refers, any force that would produce an appreciable effect against the great hosts the Continental nations can bring into the field. If we had a law of conscription in this country—but I never expect that this country will ever adopt such a plan for raising its forces—no doubt it would be desirable to adopt the offensive plan which is advocated. But whatever may be the differences of opinion on this point, there can be no doubt as to the necessity of making arrangements by fortified harbours, and by local means of defence, to set our fleet free for the protection of our commerce, and for offensive operations *at sea* against the enemy, in whatever quarter he may show himself.

Gentlemen, you will join with me in giving our best thanks to General Collinson for the admirable paper he has read to us.
