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Friday, June 8, 1883.

ADMIRAL SIR FREDK. W. E. NICOLSON, BART., C.B., Vice-Chairman,
in the Chair.

HARBOURS OF REFUGE IN CONNECTION WITH THE SUBJECT OF CONVICT LABOUR.

By Colonel Sir CHARLES H. NUGENT, K.C.B., R.E.

It will perhaps be matter of surprise to some at least here present, why I, who neither am a naval Officer nor have any connection with convict prisons, should have undertaken this subject.

In explanation of my position here I may say that I have undertaken it at the request of the Council of this Institution.

Possibly the Council, the services of a more qualified exponent of this subject failing them, may have considered that long connection with the defences of Great Britain, which led me to a personal examination of nearly every bay in the United Kingdom, and necessitated a careful study of the Reports of the Commissions on Harbours of Refuge, as well as many years' personal experience of the employment of convict labour on large national works, were sufficient qualification for the introduction to you of this subject.

The interest in Harbours of Refuge has been recently revived, partly, perhaps, because Government is about to undertake the completion of Dover Harbour, and partly, perhaps, because it is understood that a Committee which was assembled in 1880-81 to consider the measures necessary for the defence of our principal commercial harbours was, in the course of its investigations, drawn to examine the merits of Filey as a position for a Harbour of Refuge on the East coast; and it is wise upon the part of the Council of this Institution, which has done so much to rouse public opinion upon many matters of national importance, to bring this subject before the public at the present time.

This may well be a subject of national interest, for it concerns a large portion of our population; it is not only the seafaring population and the shipowners who are concerned in this subject, but the shipbuilding and the mining and mercantile classes also.

Some idea of the magnitude of the interests involved may be derived from the number of vessels engaged in the commerce of the country and the number of seamen employed in them.

In 1881, 19,307 sailing and steam-vessels, of an aggregate tonnage

of 6,490,953 tons, were engaged in trading at home and abroad; they were manned by 168,098¹ seamen and boys.

In addition, 66,682 boats were occupied in fishing, manned by 124,561 men and boys.

So that the operatives afloat directly interested in, and to be benefited by, the creation of Harbours of Refuge number 317,464, and if the Royal Navy (45,100 seamen and 12,400 marines) be included the number rises to 374,964.

It is probable that at least 120,000 men are employed in the collieries, a great part of the produce of whose labour is sea-borne.

But the pecuniary considerations involved are very large, for instance, the actual value of the vessels afloat may be taken at 63,614,744*l.*, and the merchandize they carried last year was worth 694,155,264*l.*

Of course this latter figure is very fluctuating; it is 3,538,657*l.* less than in the preceding year, 1880, when it was 85,868,792*l.* greater than in 1879.

But fluctuate as it may, the value of the commerce always on the water is so great that neither pains nor money should be spared to insure its safety.

In the matter of Harbours, it is worthy of notice that, while of late years our Government has been supine, the French, with not half our trade,² have been most active. On the shores of the Channel alone, and within a length of 250 miles, viz., between Dunkirk and Cherbourg, they have undertaken works at nine harbours, representing an estimated expenditure of 5,574,000*l.*

Dunkirk	£2,000,000
Calais	748,000
Boulogne	680,000
Tréport	144,000
St. Valéry	82,000
Dieppe	580,000
Fécamp	240,000
Havre	920,000
Honfleur	100,000
Cherbourg	80,000
	<hr/>
	£5,574,000

As preliminary to the consideration of our subject it may be well to state what the conditions are which a Harbour of Refuge should satisfy:—

1. It should be easy of access in all weathers.

¹ This is exclusive of foreign seamen, who numbered 24,805.

² Imports of France..... £163,050,000
Exports „ 123,080,000

£286,130,000

(Exclusive of Colonial trade.)

2. It should have ample and secure anchorage.

3. It should have good holding ground.

4. It should be available for as large a number of vessels as possible.

These are the aqueous and subaqueous considerations, which must have their due weight in the selection of a position for a Harbour of Refuge, but they must be influenced by other, terrestrial, considerations, such as the nature and form of the adjoining ground, and whether these lend themselves to economical construction, also whether they afford facilities for communication with the commercial centres of the district.

The Royal Commissioners on Harbours of Refuge, in their Report in 1859, drew a marked distinction between *Harbours of Refuge*, in which in bad weather, "all vessels," not those only habitually frequenting that part of the coast, "should be able to take shelter for the purpose of avoiding the risks and wear and tear incurred by keeping the sea, and the loss of time occasioned by being driven back;" and *Harbours*, styled by them *Life Harbours*, of which "facility of access and sufficient shelter are the essential requisites," and of which the positions must be governed by local considerations.

It is not my purpose to devote much consideration to these latter, which the Commissioners recommended should be constructed, either out of funds raised locally, or out of part local and part Imperial funds, and should be thereafter maintained by tolls levied on the vessels making use of them.

The object of the Council is that attention should be drawn to *Harbours of Refuge*, designed to offer hospitality to all vessels alike, independent of nationality, and which, being for the general good, should be constructed and maintained, as national undertakings, out Imperial funds.

If then the Imperial Government undertake the construction of harbours of refuge, the question for its consideration is how it can most economically construct them.

The answer is not far to seek. In the convict prisons it has a large body of men, about 10,000, whom it is compelled to maintain, and for whom, on social even more than on economical grounds, it is compelled to find employment. Fortunately the form of labour most suitable for their employment is precisely that which enters so largely into the construction of some descriptions of harbours of refuge.

I refer to unskilled labour, or to labour so comparatively unskilled that expertness in it can be acquired in a short time, and well within the average duration of penal sentences.

There are other forms of work upon which labour can be applied in large bodies, such as the Dock Extensions at Chatham and Portsmouth, and the massive fortifications at Portland, but these are beside the subject of this paper, and I refer to them here simply because the labour of the convicts upon them has been attended with satisfactory pecuniary results; no doubt, the main portion of these works consisted of unskilled labour, and the nature of the works was such that convicts could be employed in considerable numbers upon them.

When employed in small numbers the labour of convicts will not be remunerative.

In my opinion, not less than 500 convicts can be profitably employed upon any one independent work, though I am aware that it has been proposed to make use of as small a number as 200.

In the "Report of the Directors of Convict Prisons for 1881-82," I find that upon the War Department and the Admiralty works at Portland the proportion of unskilled labourers is about two-thirds of the number of prisoners employed on them; the exact figures are '648. I find also that the average number of male prisoners does not vary very much from year to year; that last year the number was 10,221, and that 8,489¹ of these were undergoing sentences of five, seven, and ten years, and I assume for the purposes of this paper that a totally unskilled but able-bodied prisoner can become expert,—as a labourer in one year, as an excavator in one and a half years, and as a quarryman in two years.

It is no mere assertion on my part that the construction of certain descriptions of harbours of refuge does afford unusual facilities for utilizing convict labour; it rests upon the experience of the employment of convicts for upwards of fourteen years in the construction of Portland Breakwater and Harbour works, which is perhaps the most successful construction of its kind, and upon their employment upon several similar constructions abroad.

In a paper read before this Institution in March, 1875,² by the eminent Civil Engineer by whom these works were constructed, it is stated the cost per acre of sheltered anchorage, taken over the deep water portions, was—

	£
At Portland, built with the aid of convict labour	800
„ Plymouth.....	1,897
„ Holyhead	6,425
„ Dover	12,755

The difference in cost is of course only to a limited extent attributable to saving consequent upon the employment of convict labour; much is no doubt due to the advantages the harbour of Portland owes to nature in respect both of form and of depth of water, as well as to the position and description of the adjacent beds of stone of which the breakwater was formed, and the mode of construction adopted; but still, crediting these as largely as you may, enough remains to point to a decided economy from the employment of convict labour.

I may remark here that the so-called island of Portland is an exceptionally excellent position for a prison establishment. Its almost isolation from the adjacent land of Weymouth, with which it is connected by a narrow beach of shingle, .21½ miles in length, renders

¹ 3,045.....	5 years.
3,637.....	7 „
1,807.....	10 „

8,489 Total.

² On "Military (or Strategic) and Refuge Harbours." By Sir John Coode, Kt., M.I.C.E. Journal, vol. xix, No. LXXXI.

escape in that direction well nigh impossible. Elsewhere it is washed by an unkind sea. The form of the "island" and the absence of trees, which offer nearly the whole of it to observation from its highest point, combined with the paucity of the inhabitants and their habits of reserve, render the maintenance of discipline an easy task.

It is difficult to find another position which lends itself so conveniently to the employment of convict labour, but I shall by-and-by be able to indicate at least one position that is not far short of it in such natural advantages.

It may be said that in undertaking any new work by convict labour it will be indispensable to erect Prisons with the necessary accessory buildings, that the cost of these will be very great, and so far unnecessary that in all probability, seeing that the number of prisoners shows no sign of annual increase, the existing prison accommodation will be sufficient for prison purposes for years to come.

In the Report already alluded to, it is stated that in the quinquennial period 1877-82, while the population of England and Wales has increased by $1\frac{1}{2}$ millions, the number of prisoners (convicts) has actually decreased; it is less by four in 1882 than it was in 1878.

Though it does not enter into my subject, I may be permitted to observe here that this is a most gratifying result; there are other gratifying results recorded in this Report, especially the diminution in the proportion of younger criminals, but I may not dwell upon them now.

Before dealing with the cost of a Prison Establishment, I would remark that after all economy is secondary to the industrial and reformatory employment of prisoners; nevertheless, admitting that the cost of a new Prison Establishment is unremunerative expenditure, it is but a small portion of the expenditure upon a large work such as a Harbour of Refuge.

The Royal Commission of 1879 on the Penal Servitude Acts observe upon this point: "No doubt, even if it were not advantageous in a pecuniary point of view to employ convicts upon public works"—such as Portland Harbour works—"it would still be most desirable that such employment should be found for them, as an essential part of penal discipline."

Assuming that a prison establishment for 1,000 prisoners would cost 75,000*l.*, this would represent the first charge for the employment of 1,000 prisoners upon a great Harbour of Refuge, after which the annual charge for prisoners, no matter how long the duration of the work, would be about 4,500*l.* per annum.

From the same Report it appears that the average annual charge¹ to

¹ Annual charge:—	£	s.	d.
Portsmouth	9	12	1
Borstal	7	4	11
Chatham	1	12	3
	<hr/>		
	18	9	3
Deduct for Portland	0	13	3
	<hr/>		
Total	£17	16	0
	<hr/>		
Average per prisoner	£4	9	0

the country per prisoner in the four prisons of Portsmouth, Borstal, Chatham, and Portland is 4*l.* 9*s.*, after defraying the salaries, and charges, for the staff, for victualling and clothing of prisoners and their officers, for repairs to buildings, and all incidental charges.

The more quickly the work is executed the less will be the charge for labour, for plant, and for such supervision, and there must be some such, as is entirely civil.

Let us assume that the percentage of labour in such a work as we are considering is 25 per cent., and that a prisoner does about two-fifths of the work of a free man, the saving arising from the employment of prison labour will be 10 per cent., but the contractor's profit will also be saved, and this may be set down at 10 per cent., and so will a portion of the charge for superintendence, say 2·5 per cent.; so that the net saving arising from the employment of prison labour may not unfairly be stated at 22·5 per cent., which in a work costing 1,000,000*l.* amounts to 225,000*l.*

Setting the cost of a prison establishment¹ at 75,000*l.*, and the sum of the annual charge for twenty years, reckoned at 4,500*l.* per annum, at 90,000*l.*, the saving above is reduced to 60,000*l.* Probably a large portion of this will be absorbed by the enhanced charge for plant, which charge will rise with the length of time in which the work is under construction, and by the increase in the charge for insurance against damage from storms, which will rise also, but in a still greater degree, with the time the work is under construction.

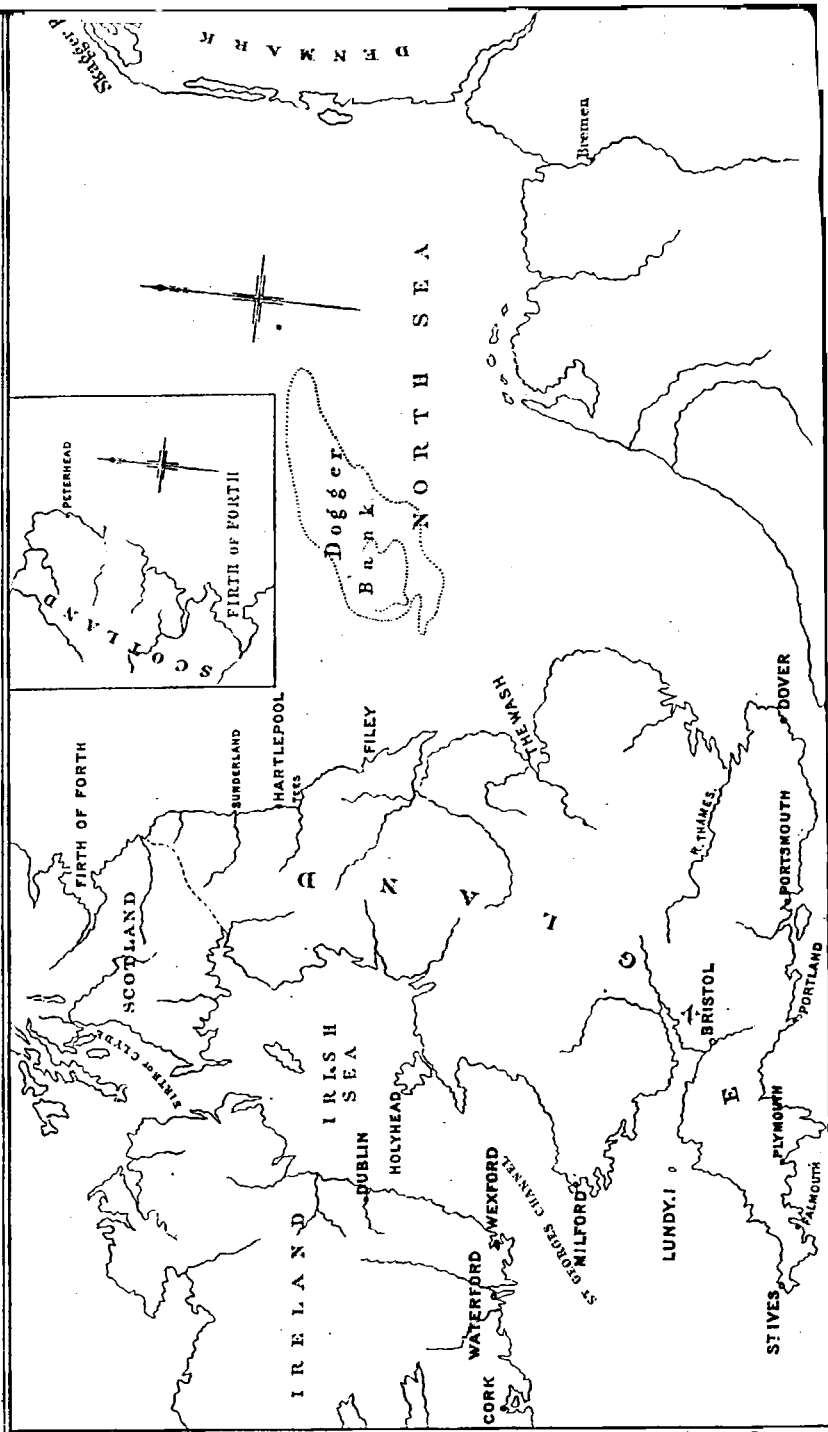
So that even if there be little or no saving, it may be confidently stated that there need be no loss, consequent upon the employment of convicts, even if they consume, which is not improbable, twenty years in doing what might well be done by free labour in twelve years.

But, after all, extreme rapidity is not a matter of vital importance in such constructions, as the water which they enclose can be made use of by shipping while they are in progress. Moreover, the employment of prisoners is attended with this further advantage, viz., that Government retains the work in its own hands, and is at liberty to vary at pleasure the design to meet unforeseen circumstances, and in such works, even with the most careful prevision, every circumstance will never be foreseen, whereas if the work were placed out at contract such variation would be inadmissible, or would give rise to extra cost and constant dispute.

The subject of Harbours of Refuge has been so long before the public and has been so much discussed that it is no longer a question of whether they are needed, the question is where they are needed, and in choosing a position for such harbours the still existing tendency of ships to increase in size cannot be overlooked, as this, by rendering very large and open harbours a necessity, practically very much lessens our choice.

It might, indeed, be thought that steam would have rendered vessels to a high degree independent of weather, and that so the necessity for Harbours of Refuge would be less, but this does not, I think, prove to

¹ For 1,000 prisoners.



be the case; there are various classes of steam-vessels built, and if true of the highest classes and of the best of their classes, it is by no means true of the older and of the inferior classes, which not only make indifferent weather, but are manned by less efficient seamen than were the sailing vessels of the past time; moreover, the smaller coasting and fishing craft have to be cared for as much as ever.

But a Harbour of Refuge should be available for the ships of Her Majesty's Navy as well as for trading ships, and, therefore, should not only be placed conveniently for their use, but be of a construction to meet their wants.

If you direct your attention to the map of Great Britain, you will see that the East coast claims the first consideration, the South coast is already well provided, and the West coast, which is not so much exposed as the East coast, has already three points of refuge.

When this subject was last before this Institution, and I may say was last prominently before the Public, the claims of the East coast were obscured somewhat by Dover Harbour, but the recent resolution of Government to complete this harbour has removed it from the sphere of discussion, and there is no longer rivalry between the two.

When I commenced to consider this subject, I had it in my mind to leave untouched the military aspect of the question, but I soon found that it was impossible to disconnect civil from military considerations, inasmuch as the very circumstances which tend to collect the shipping of the Kingdom to one spot, either as a place of refuge or as a port of call, render that spot an objective point for an enemy, and, moreover, in many cases at least, the facilities of water and of land, which serve to render particular sites eligible or preferable as Harbours of Refuge, serve also to render them good Bases of Operations for an enemy.

It is impossible, then, to discard from consideration the military aspect of the question, and I am the more satisfied with this conclusion, as the eminent Civil Engineer who dealt with this subject in this Institution in 1875 found here strong ground.

I mention this lest civilians, if such there may be here to-day, should carry away the impression that a military man can only treat a subject from a military point of view.

The military considerations which at once suggest themselves are,—that it should be possible to prevent an enemy from entering or obtaining possession of the Harbour, or, indeed, from destroying from a distance the shipping collected therein;—this is a matter of some difficulty in these days of long-ranging guns and of armoured ships;—that if, unfortunately, he has succeeded in getting possession of the Harbour, he should not be able to remain in it; these two considerations require for their fulfilment a particular form of Harbour, which in its turn needs, or is best attained by, a particular coast line, and by a particular configuration of the ground which surrounds and shelters the shore.

It has been already stated that the South coast is well provided with Harbours of Refuge; it has three artificial Harbours, all of the first class, Plymouth, Portland, and I suppose I may include Dover,

with the outlying Harbour of Alderney; it has also the great natural Harbour of Portsmouth, and the minor Harbour of Falmouth.

Upon the West coast there are Milford Haven and the Firth of Clyde, with the intermediate harbour of Holyhead, so that upon this coast there is already some refuge, but upon the East coast, for a distance of 405 miles, viz., from the Thames to the Firth of Forth, there is no Harbour which ships can make in all weathers, or in which they can coal with absolute certainty in all weathers.

The intermediate Harbours either are not suitable for the vessels of the great size of the present day, or are difficult to make in bad weather.

Yarmouth Roads, in which Nelson's fleet lay so long, and which was often the rendezvous of our fleets, has lost its usefulness in consequence of changes in the sand to which the roadstead owes its existence, the southern entrance having become "barred" to vessels of size, and the northern entrance having become prejudiced by patches of sand.

Hollesley Bay is no longer suitable for large vessels.

Harwich Harbour has only 16 feet of water at low water, and the entrance is through a narrow channel with a sharp turn in it.

The Humber, with wind from the eastern quarter of the circle, is not a water in which vessels may ride with safety.

The Tyne is the outlet of a small river, and no vessel could attempt its entrance in certain weather, or could remain in it with comfort, if it succeeded in entering.

I believe I have fairly summarized the Harbours on the East coast, and it is sufficiently evident that not one of them will satisfy the conditions essential to a Harbour of Refuge.

Careful consideration and personal examination of this coast have led me to the conclusion that the Royal Commissioners of 1859 were right in recommending Filey as the place for a Harbour of Refuge on the East coast.

Moreover a deliberate consideration of the evidence taken by the Commissioners impresses upon me that the balance of advantages is in favour of Filey. But I set great store by the opinion of Admiral Sir James B. Sullivan, one of the Royal Commissioners; with some experience both of naval and military surveyors, I have never met anyone whose eye for ground, if I may use the expression nautically, was so good; he strongly recommends Filey as satisfying the conditions of a Strategic Harbour, as well as of a Harbour of Refuge; he points out that in addition to its advantages of position, it is within reach of our numerous coal-fields, and he mentions, one very conclusive fact, to my mind at least, "that while each witness said his own port was the best, they all said Filey was the second best."

There are no dangerous banks or shoals in the neighbourhood of Filey; the coast here compares in this respect favourably with other parts of the East coast.

Filey might become a great rendezvous for fishing-vessels; it is 60 miles from the Dogger Bank, and the centre of the best fishing-ground on the coast of Great Britain.

The bottom in Filey Bay is Speeton clay, similar to the Kimmeridge clay at the bottom of Portland Bay, and is of a singularly tenacious character.

For strategic purposes Harbours of Refuge require development in other directions; they should have facilities for coaling, abundant supplies of water, plenty of wharfage, and ample means for the embarkation and disembarkation of troops, horses, guns, and all the munitions of war, and for this purpose they should be in direct communication, by rail and by telegraph, with the military centres and arsenals.

It has been estimated that a Harbour of Refuge of the most ample dimensions may be constructed at Filey for 1,000,000*l.*; say that it will cost 1,250,000*l.*, this sum, large as it is, is a mere trifle, somewhere about $\frac{1}{6}$ th per cent. upon the annual foreign trade of the country, which may be roughly stated to be at present 700,000,000*l.* with no upward tendency.

From the Returns made to the Board of Trade, of sea casualties, which occurred on the coasts of the United Kingdom, or were reported as having been met with Abroad, I find that last year the total losses of vessels were 1,303 of, in the aggregate, 378,424 tons, of which 174 were steamers, of, in the aggregate, 103,284 tons, and 1,129 were sailing vessels, of, in the aggregate, 275,140 tons; and that in addition to this there were 1,622 serious casualties, to 508 steam, and 1,114 sailing vessels, of, in the aggregate, 696,971 tons, by which much destruction was wrought to both vessels and cargoes; also that there were 3,470 minor casualties to 1,039 steam, and to 2,431 sailing vessels of, in the aggregate, 1,140,123 tons, of which it is not necessary to take notice here.

The gross total of British vessels lost or injured last year (1881-82), was 6,395, of, in the aggregate, 2,585,418 tons.

Going back to the total losses, if we value the classed steam and sailing vessels at 12*l.* and 8*l.* per ton, respectively, and the unclassed vessels, though these are probably classed in the smaller registries, at 10*l.* and 6*l.* per ton, respectively, the loss of property in vessels alone amounts to 3,265,656*l.* It would not perhaps be far wide of the mark if their cargoes were valued at one-fourth as much more, in which case the value of the property lost would be 4,082,070*l.*

It is very difficult to assign a value to the damage done to the shipping which suffered serious casualty, at least without spending over the Tables issued by the Board of Trade more time than I have had at my disposal, but the value of the vessels alone, calculated as above, is 7,087,640*l.*, and estimating the cargoes as before, and that both suffered depreciation of one-fourth,—the value of the property so lost would be 2,214,887*l.*, and the loss last year in British vessels at home and abroad may be stated at over 6,000,000*l.*

It is proper to observe that the casualties last year were above the average.

It would appear from the same Tables that the British vessels, lost last year on or near the coasts of the United Kingdom, were 441, amounting, in the aggregate, to 70,214 tons,—and which suffered

serious casualty were 615, amounting, in the aggregate, to 146,830 tons; using the same method of calculation as before, the gross value of the property lost on or near the coasts of the United Kingdom was 1,615,726*l*.

But if allowance be made for 82 and 104 foreign vessels, of, in the aggregate, 13,000 tons and 24,471 tons respectively, which were lost and suffered casualties on the coasts of the United Kingdom, the amount of property lost rises to 1,806,903*l*.; and if we assume that two-sixths of this was lost between the Forth and the Thames, the gross total of property lost upon this portion of the East coast may perhaps be set down at 722,760*l*.

In the same year 1,097 lives were lost upon the coasts of the United Kingdom; of these 289 were lost between the Fern Islands and the North Foreland, between which places 121 vessels were lost, and 213 vessels suffered serious casualties.

I am far from saying that these lives and this property, or even the greater portion of both, would have been saved to the nation if there had been a Harbour of Refuge in the centre of this danger-fraught and unprotected coast; but I do say that if there were a Harbour of Refuge there, we might with reason anticipate an important diminution in these melancholy figures.

But the 1,097 lives lost by no means represent the dangers which lie about our coasts; in the same period 4,066 lives were saved from shipwreck; and the total, 5,183, which represents the number annually in mortal and preventible peril, may well spur us on to spare no means which afford a hope of mitigating this peril.

It has been already stated that the total of the Foreign and Colonial Trade of the United Kingdom was last year 694,155,264*l*.; deduct from this the trade of London and Liverpool, 394,264,025*l*.; of the remainder, 299,891,139*l*., one-third belongs to the East coast between Berwick and the Thames; the exact figures are 96,118,898*l*.

But judged by the tonnage, the coasting trade on this part of the coast is nearly, if not quite as much more, so that possibly the passing trade may be set down at 190,000,000*l*. annually.

The Foreign and Colonial Trade of the East coast is nearly twice as large as that of the South coast, and about $4\frac{1}{2}$ times as large as that of the ports of the Bristol Channel, the exact figures for these being 50,606,421*l*., and 22,896,283*l*. respectively.

In the gale of autumn 1880, the wind blowing from the north-east, many vessels were wrecked and 164 lives lost upon this coast, and a large number of these were lost south of Filey between Flamborough Head and the coast, having been driven down and wrecked for want of shelter.

In the gale of October, 1881, wind blowing from the north north-east, 36 vessels out of a total of 45 were wrecked between Berwick and the Wash.

It must be conceded then that the East coast, between the Thames and the Forth, a distance of 405 miles, claims first attention:

1. Because it is unprovided with any Harbour of Refuge.
2. Because its passing trade is far in excess of that of any

equal extent of coast (excluding the mouths of the Thames and the Mersey).

3. Because the proportion of casualties is greater thereabouts than upon any equal extent of coast, excluding the Thames and the Mersey.¹

Great energy has been manifested, and much money has been spent in improving the local Harbours at the principal ports of this coast, but they do not supply the want. This is clearly shown by the return of casualties in the rivers and harbours of this length of coast, which are 28 of the casualties in the rivers and harbours of the United Kingdom, the mouths of the Thames and the Mersey being excluded; and the Royal Commissioners of 1859 state that the preponderance of evidence—being that of thorough seamen and highly intelligent men, the greater part of whose lives had been passed at sea upon the coast,—was in favour of a Harbour of Refuge at Filey, as that which would prove most conducive to the saving of life.

It appears, moreover, that fishermen from all parts of England resort in the autumn² to this coast to engage in the herring fishery, and that no other spot would be so convenient for refuge for them.

The Commissioners add that for convenience as a port of call, for the collection of convoys, for security from attack, and for a naval station, every advantage would be afforded by the position of Filey.

In this I thoroughly agree with them, and I will add that the nature of the bottom and the complexion of the adjoining coasts are such that there is little likelihood of a Harbour there silting up.

Moreover the locality is very suitable for the employment of prison labour.

The country is open and thinly inhabited, there is an excellent position for a Prison Establishment a little in rear of Filey Point, upon level ground of moderate elevation, 100 feet above the level of the sea, which may be easily cut off from the world by a very modest expenditure of fencing. The point itself is a hard oolitic stone of fairly good quality,—the middle oolite,—easily worked, but very enduring in water, in fact very similar to the stone at Portland of which the breakwater there was made, and the process of construction would probably follow the same lines, viz., quarrying near the point, running

¹ Take for instance the fishing trade: eleven-twentieths of the fish caught in the United Kingdom passes inwards through four ports of the East Coast.

In 1878 the quantities passed through these ports were:—

Grimsby.....	59,407 tons.
Hull	26,938 „
Scarborough	7,133 „
Whitby	3,600 „

97,078 tons.

The total now, 1883, probably much exceeds 100,000 tons.

² In 1859, 600 boats and 5,000 men were so engaged. In 1876, the number of boats of 15 tons and upwards was 953, with an aggregate tonnage of 52,119, in number one-third, in tonnage two-fifths of the fishing boats of the United Kingdom.

the quarried material down the inclination formed in quarrying, and depositing the material by tipping it into the water from a timber staging, or possibly by means of hopper barges. A portion of the upper part of the breakwater would probably be constructed of either squared stone, or Portland cement concrete blocks made with broken local stone, making use as far as possible of the natural ledge of rock called Filey Brigg, which is indeed a continuation of Filey Point, and run out for about 1,100 yards in a direction most suitable for the commencement of a breakwater.

This ledge was turned to such a use by the Romans, who made a harbour here, the remains of which are still to be seen under water.

As far as the security of the prisoners is concerned the position here is almost as favourable for a Prison Establishment as the position at Portland.

Strategically Filey is most convenient; it is almost central, it is the same distance from the outlet of the Baltic and from Bremen, and it is nearer than the Forth to the outlet of the Baltic, while it is almost the same distance from Bremen as Dover; it is therefore the very best place for protecting the coast, while it is also the best place for commencing offensive operations towards either of the localities indicated.

This will be clearly seen by an examination of the accompanying diagram.

Defensively it is much favoured; the Front of the proposed harbour from Reighton to the point would probably be 6,000 yards in length, and as the breakwater would probably have a saliency of 1,600 yards in advance of this Front, advantage might be taken of the saliency for an advanced work on the breakwater, the flanking works being placed on Filey Point and about Reighton.

The wolds overlooking the bay are open and rolling, and afford good fighting positions, in the event of a hostile landing being made either above or below Filey, while favourable sites can be found on them for defensive works; these works should be constructed by the convicts as the harbour works proceeded, and need not be very costly.

Upon the West coast of England the recommendations of the Royal Commissioners of 1859 appear to have been limited to that part of the coast between Land's End and Hartland Point, considering doubtless that the upper part of this coast was sufficiently provided for by Holyhead, and by existing smaller harbours, mostly upon the Irish coast, in the improvement of which they proposed to spend about a quarter of a million.

The expediency of spending so much upon these smaller harbours is, to my mind, doubtful; in some of them the water is so shallow and circumscribed, and the entrance so narrow, that after all is done the accommodation must be of an inferior character.

But between the Land's End and Milford Haven some refuge appears to be wanted, and though St. Ives Bay, the position selected by the Commissioners, is good, it does not appear to me as good for commercial purposes as Lundy Island, from which their favour seems to have been diverted by the expense of construction consequent upon

the depth of water round it; the depth to be dealt with varies from 7 to 12 fathoms.

It certainly is not as good strategically, for Lundy is central, and it is not as good a position for the employment of convict labour, for which a small island standing away from the coast in deep and often troubled water seems in every respect suitable; if the work be performed by convict labour neither expense nor time need be main considerations, especially as discipline can be well maintained, and the place must be exceptionally healthy.

Moreover, the area proposed to be enclosed at St. Ives, at an estimated cost of 140,000*l.*, is comparatively insignificant, amounting altogether to 180 acres, of which not 100 acres would be available for the largest class of vessel.

For the southern portion of the West coast I propose Lundy Island, and, strategically, this part of the coast will then be well provided. If you cast your eyes for a moment upon this diagram, you will see that the waters here will be strongly guarded, and that the important places higher up the Irish Channel, to which they give access, are cared for.

The strongly fortified harbours of Cork and Milford, and a well-defended national Harbour of Refuge at Lundy Island, with Waterford, a defended harbour for swift vessels, of lighter draught of water, but heavily armed, a little in rear of the centre, form a military position so unassailable, that I doubt an enemy's attempting it.

But after all the necessity, either on commercial or strategical grounds, for a Harbour of Refuge here, is not nearly so pressing as it is at Filey; probably, too, with Dover and Filey on hand, there will be no convicts to spare for such purposes for some time to come, and Lundy may well wait.

I am aware that places other than those recommended by the Royal Commissioners have found strong local advocates, and since I have been engaged upon this subject I have received communications with reference to some places. In some cases my want of knowledge of the locality has unfitted me for their consideration; in others, the proposals were so evidently guided by local wants that they seemed foreign to the subject of this discussion, and if, therefore, I do not bring them forward, it is not from want of courtesy to my correspondents.

Moreover, there is a feeling upon the part of some shipowners that Harbours of Refuge are not an unmixed good, to quote the words of the Provost of Montrose, in these times shipowners do not like Harbours of Refuge, and do not want their ships to go to harbour if it can be avoided.

In one sense that is a right feeling, especially if it should lead to ships being well found and carefully manned; but whether or how far we may give our assent to such feeling, it is evident that Harbours of Refuge may be easily multiplied too far, while for strategical reasons the fewer they are, enough being provided, the better; our fleet is not numerically very large, the Colonies and the great water highways of our carrying trade must demand a large portion of it for

their safeguarding, and it is above all things expedient to retain the ships which remain in as little divided a state as possible; a few well-chosen strategical positions in which our ships can, if necessary, find shelter, coal, and water, with munitions of all kinds, and from which they can operate in masses large enough to keep an enemy's attention rivetted upon them, afford the best guarantees for the defence of these islands, and for retaining in our own control the enveloping waters which have hitherto been our best protection.

Thus may, to use the Laureate's words—

“ Her throne be kept unshaken still,
Broad based upon the people's will,
And compassed by the inviolate sea.”

Captain Sir GEORGE NARES, K.C.B., R.N., Board of Trade : It is impossible offhand to criticize in detail such an important paper as we have had placed before us by Sir Charles Nugent. However, before any remarks are made upon it, I would take exception to the wording of the heading. It is termed “Harbours of Refuge in Connection with the Subject of Convict Labour.” Sir Charles tells us that we cannot employ with advantage less than a certain number of convicts, and that the harbours that they construct are not to be considered in connection with the time occupied on the works. Now I say that you cannot thus couple harbours of refuge from storms, with convict labour, although you may so connect large strategical harbours where the constructive works can be carried on for a large number of years. For instance, we are told that perhaps in twenty years we shall have Dover completed. Are we to wait all that time for the important harbour at Filey, which, as Colonel Nugent tell us, is wanted not only by the nation, but by the fishing and maritime population? If constructed by convict labour it will be the next generation before it will be even commenced; are we to wait all that time? We are told that the number of people connected with the mercantile marine at home and abroad is 160,000 seamen and boys, and that our fishing population numbers some 124,000 seamen and boys. Now if we deduct the number engaged in the foreign trade that are actually absent from Great Britain, it follows that there are at any one time a greater number of men employed in the fishing boats dependent upon harbours for refuge from storms than there are in the larger vessels engaged in the coasting and foreign trade. What we most want for refuge purposes is a large number of small harbours all round the coast for the men engaged in the fishing boats and smaller coasters.

Captain T. A. SWINBURNE, R.N. : I wish to make an exception with regard to Filey. I think it would be very much more advantageous to have the harbour of refuge in Tees Bay. Tees Bay is the weakest part of the British coast, Middlesbrough, Hartlepool, Sunderland are all unprotected. That would be the great centre both as a harbour of refuge and a harbour for coaling and supplies of all kinds for our ships; what is more it is in a bight on the east coast, and the deepest part of the bight in Tees Bay. Ships taken with an easterly wind of course run for the bight. I think the harbour should be at Tees Bay and not at Filey.

Admiral Sir ERASMUS OMMANNEY, C.B., F.R.S. : The chief points to be considered in the employment of our convict labour are those connected with Imperial and commercial interests, those connected with the punishment of criminals, and also with their reformation. Taking all these points into consideration, I think there is no better return to the nation for the money expended, than that of employing convict labour in the construction of breakwaters or ports of refuge all round our unsheltered coasts. Every breakwater built must add to our national wealth. The only criticism I should wish to make is that there are certain places in which I think convict prisons give a comparatively unremunerative return for the great expenditure upon them. Take for instance Dartmoor Prison. Perhaps, Colonel Nugent, you will inform us what we get in return for the great expenditure of money there compared with what you are now advocating, such as the construction of the harbour of Filey. I have no doubt there are a great many of my brother

Officers here who will bear out the very important Imperial results that we have attained in the work thus carried out. Take for instance the dockyard at Bermuda, and the mole at Gibraltar, and consider what great benefits we now derive from these works as a maritime nation. I quite agree with what Sir George Nares said. It is not only in the completion of our military ports that we can employ convict labour, but there are many points on the coast on which breakwaters would be of essential value for the protection both of our coasting trade and for fishing vessels. Take one point for instance, which I think has escaped your notice. Mounts Bay. There is a reef of rocks there which affords foundation for making a very admirable harbour of refuge, where they could more readily find shelter instead of going to Falmouth. I think that looking at these four considerations, Imperial, commercial, the punishment and reformation of convicts, there is no better return to be gained for this country than by the employment of convict labour in the construction of breakwaters.

Sir JOHN COODE, C.E. : I congratulate the Council and the members of this Institution on the choice that they have made of a writer on this very important subject of harbours of refuge in connection with the employment of convict labour. The paper bears evidence in itself that the writer has dealt with the subject in no ordinary way. His is not a mere theoretical view of the matter, for it was my pleasure, if I may be permitted to say so, one of the pleasantest professional associations of my life, to work side by side with Colonel Nugent for very many years at Portland, he on the fortification branch, and I on the harbour construction branch of that great national work. I was in communication with him I may say daily, very often twice a day, and therefore I know the thorough and intelligent way in which he entered into, and made himself master of all the facts and hearings of this question of the employment of convict labour. If I gathered rightly what fell from Sir George Nares, the exception he took was simply this, that Colonel Nugent has called these harbours, harbours of refuge, rather than strategical harbours.

Sir GEORGE NARES : The Council, not Sir Charles Nugent.

Sir JOHN COODE : Who chose the title I do not know ; but I am of opinion that a strategical harbour on the east coast of England is a great want of the day, and that the subject is one which should come naturally before this Institution. It was from a strategical point of view that I as a civilian (wisely or unwisely) undertook at the request of the Council of this Institution to treat the subject some seven or eight years ago. The views enunciated by Colonel Nugent in this paper are so entirely in accordance with those which I laid down in a professional report—no less I am sorry to say than a quarter of a century ago—with reference to Filey as a commercial harbour, and so fully in harmony with the views which I had the honour of putting before this Institution about eight years ago, that I really have very little to say on that branch of the subject to-day. I should like to be permitted here to say that I cannot yet see why Dover should have priority over Filey. I may be held to be prejudiced in favour of Filey, but whilst I am free to admit the importance of Dover, I see a still greater need for a strategical and a refuge harbour for the mercantile marine and for the fishermen on the east coast of England, and I say that the spot on that coast which *par excellence* is best adapted for such a harbour is Filey Bay. Whether you take it from a national point of view as affording more profitable employment for convicts, or as yielding a greater benefit for the expenditure of a given sum of money, the claims of Filey are, in my judgment, decidedly superior to those of Dover. I think Colonel Nugent was not a little hard upon the Tyne. A great deal has been done on that river, and the Tyne has rendered very good service to many vessels overtaken by storms ; still occasionally when there happens to be a strong easterly gale blowing, and at the same time a considerable quantity of flood water coming down the Tyne, there is what sailors call a “nasty” sea at the mouth of the Tyne, and small vessels do not like then to encounter it. So far I agree with him, but I think he has over-rated that difficulty, because it only occurs occasionally. The Tyne Commissioners have done very good work, and they deserve the greatest credit for the spirit which they have exhibited. I think it would have been more impressive if the author had in his paper added

together the amount of the loss last year in vessels and the loss in property on the coasts of the United Kingdom; the two amount to the large sum of 7,340,000*l.* I think that is a very important, and very serious fact. Then, as to the question of the relative value of the employment of convict and other labour, I may say that for the last thirty-six years, without any cessation or interruption, I have had harbour works in course of construction under my direction (I do not say on one harbour, but on different harbours, extending over that long period). by convict labour in different parts of the world. At this present moment there are four Colonial harbours being carried on under my direction, and from my designs, employing somewhere about 1,000 or 1,200 convicts; I therefore know something of the value of convict labour. Under such circumstances, and seeing that it fell to my lot to organize the engineering arrangements for the employment of convict labour in the first experiment that was made in the country—I mean at Portland—I naturally take something more than an ordinary interest in this convict labour question. Colonel Nugent is perfectly right in saying that from the experience at Portland, extending over fifteen years, with an average of 800 or 900 convicts always employed—the number sometimes amounting to 1,200—the average result was that the work got from the convict amounted to about 40 per cent. of the labour of a free man. I see no reason whatever why, under proper management, you should not get from a convict 50 per cent. of the labour you get from a free man. That applies at home. As far as regards the Colonies, where we employ black labour, the proportion is very different. There we find we can get out of the convict very nearly as much as we can get out of the free native. There is one point which Colonel Nugent most properly called attention to, and that is, the propriety of employing convicts on large harbour work, such as he has been treating of. He has said very truly that there is a large percentage of the work to be done on such harbours which does not require that the labourer should be of a skilled class, and, taken as a whole, it is so simple that the men are very easily educated up to the necessary mark. I think he has perhaps scarcely given the convict system full credit for the saving when he deducts the whole value of the prison. If I understand him, he takes the 75,000*l.*, the cost of the prison, and deducts the whole value. It appears to me that if a convict prison is set up with the view that the prisoners will only be occupied on a given work for about ten or fifteen years, it might very well be that certain parts might be constructed in iron, and otherwise so devised that portions might be utilized elsewhere. Of course, as he remarks, owing to the increased time taken by the convicts, there would be a very large absorption, in the plant and establishment charges, of what would otherwise be a saving, because it is pretty obvious that in works of this kind the same establishment and arrangements that will suffice for dealing with 1,000 tons per day, will almost suffice for 2,000 or even 2,500. That absorption was felt at a very early stage at Portland; it was one of the points frequently urged upon the Convict Department, that it was most desirable, on the score of economy, to send out from the quarries a constant quantity, or something approaching a constant quantity, that should be about equal to that which the establishment was capable of dealing with. It is rather a common error to suppose that one can state offhand a general rule as to what will be the percentage of saving by the employment of convict labour as compared with free labour. It is not possible to do anything of the sort; it is not possible to say what the result will be in a given place until you have brought all your arrangements into work. There is, I believe, no other class of outdoor work on a large scale which involves the employment of so small a proportion of skilled labour as that of the quarrying operations in connection with harbours of refuge. The only kind of work that can compare with it in this respect would be a fortification on a very extensive scale, involving simply earthworks, or the quarrying of stone on an extensive scale, as at Portland, where we excavated a ditch somewhere about 120 feet wide, and 80 feet deep, with the double object of obtaining stone for the breakwater, and making at the same time a fortification ditch, and I need scarcely say to this meeting a pretty considerable fortification ditch it was. Very shortly after commencing the breakwater in Table Bay, at the Cape of Good Hope, rather more than twenty years ago, the authorities in the Colony realized the great value of the employment of convicts on a

large harbour work at one spot, and for a considerable period of time, as compared with their employment on roads and bridges, which necessitated their frequent removal and the consequent frequent removal of their barracks from place to place at considerable expense and inconvenience. Assuming a saving of 10 per cent. by the employment of convict labour, which you certainly ought to calculate upon, I think it cannot be disputed for a moment that there is a very great benefit in employing convicts upon labour which, properly regulated, shall conduce to their training to habits of industry; and it should also be borne in mind that in works of this class the employment of prison labour cannot for a moment be held to clash with free labour, as might be the case in other branches of industry. This clashing or interference of convict labour with free labour is a point which has been very much dwelt upon in the country on different occasions, but I wish to call attention to the fact that there can be no such interference in works of this class, because they are such as would never be undertaken by private enterprise, and that in that respect the employment of convict labour on these harbours must be held to be altogether free from objection. Adverting to the question of Lundy Island; looking at the changes in steam-ships and war-vessels, I am [strongly inclined to agree with Colonel Nugent that Lundy is a very suitable place for the construction of a large harbour, that would be of great value strategically, and as a harbour of refuge. He said Lundy might very well wait; that was pretty much the conclusion which our Commission of 1859 came to. I should like to say a word with regard to the fisheries: a very important matter. The fish which are caught, landed, and sent away by rail only between Whitby and the Humber, if taken at the rate of 1*d.* to 2*d.* a pound, would amount to about 3,000,000*l.* sterling annually. With regard to the Dogger Bank, there are on the bank three main fishing grounds: one called the "South-West Patch," another the "Silver Pit," and the third the "Well Bank;" these lie in a little group immediately opposite Filey. The boats fishing there now go to Whitby, to Scarborough, and a few to Hartlepool, but the bulk of them under present circumstances go to Hull and to Grimsby. Bearing in mind the frequent difficulties of getting into the Humber by reason of the strong ebbing tides occasionally aggravated by "freshes" or land-floods, the greater number, if not indeed all these vessels, would make for Filey if there were a safe harbour there; and seeing that the produce of these fisheries represents the national food to the extent of about 3,000,000*l.* at the present time, and seeing also that the produce of these fisheries is increasing year by year, the importance and the advantage of getting the fish to market at the least cost, and at the earliest moment, and therefore in the best possible condition, will be readily understood and appreciated. May I say one word about Tees Bay? As one of the Commissioners of 1859, I think it right to justify their conclusion. The fact is that our labours were devoted in an especial degree to that part of the east coast of which Colonel Nugent has spoken more particularly, and notwithstanding that three of the members, before the inquiry was set afoot, had pronounced a *prima facie* opinion in favour of Hartlepool and Tees Bay, the result of that long and searching investigation was that the seven Commissioners gave their unanimous opinion that Filey was the best place for a harbour of refuge on the east coast of England.

Major-General T. B. COLLINSON, R.E. (retired): I think myself very fortunate that I have come back again to this Institution after a lapse of some years just in time to hear this important subject brought to the front again, and particularly that it has happened that my friend Colonel Nugent has been the person selected by the Institution to bring it up; for I do not know anybody, from his long acquaintance with this class of question and his practical experience of Portland and the employment of convicts, who is more fitted to bring it to the notice of the Institution, and whose opinions will have more weight. He has alluded to the past discussions at this Institution upon this subject, and it might be thought that we are fighting old battles over again and using the same arguments once more. But I think we must bear in mind that it requires a long series of repeated naval and military operations to get an idea fixed firmly in the British Parliament. It is only by repeatedly hammering year after year in this Institution that we shall really get progress made. We have now got, I am happy to say, a considerable step in advance; and

that leads me to point out another reason why this is a favourable opportunity for bringing forward this subject again; for during the past year there has been sitting, under the direction of the Treasury, a Committee for considering the question of employing convict labour generally, and that Committee has mentioned three places where harbours of refuge might be formed, and which would be very suitable works for the employment of convicts—one is Dover, the second Filey, and the third Peterhead. They have mentioned the two latter chiefly, I believe, because they were suggested by the great Royal Commission of 1859; and the Government, I understand, have gone so far in approval of their Report, that they have in contemplation the application to Parliament for a sum of money to build a convict prison at Dover, with a view of commencing works there. Therefore I think with Colonel Nugent we may fairly consider that Dover is now wiped out of the question, and that the main consideration for this Institution is, where is the next best place to make a harbour of refuge? I think we should take care to separate well the two ideas of harbours of refuge and convicts, and not necessarily confound them together. I say this, for I observe it has been stated before the House of Commons' Committee now sitting upon the subject of the improvement of smaller harbours, more particularly with respect to the fishing interests, that it is necessary to employ the convicts somewhere, and therefore a harbour of refuge ought to be made. Now I think that is rather putting the cart before the horse. The argument for our consideration should be, is it necessary to have a harbour of refuge? and, if so, where? and then afterwards to consider whether it is practicable to employ convicts upon it. There are three distinct points for consideration in dealing with harbours of refuge: the first is the use of them for large vessels passing upon ocean trade; the second is the local trade; and the third is the use of them for war purposes. Now with respect to the first, the great ocean trade, I shall leave it to other persons more capable than I am to give an opinion as to the best position for the next great harbour of refuge, or even whether it is necessary at all to have one for that purpose; for there seems to be, indeed, some doubt on the part of the mercantile marine whether there is any such great necessity. The existing harbours upon the north-east coast have been considerably improved of late years, especially at the Tyne and Hartlepool and the Tees; and I understand, before long, they expect to get a considerable depth of water at each of those places, and although they are not available at all times they probably will be so at most times, not only for large merchant-vessels but also for unarmoured cruisers. But a more important point, I think, than the question of the ocean trade is the fishing trade; and in that I have been particularly interested of late, for my duties in Scotland obliged me to consider the question of employing convicts upon this proposed harbour at Peterhead; and there I came into connection with the fishing population, and learnt something of the importance of that population to the coast defences of this country. It is not merely the question of supplying cheap food. A great naturalist lately made a statement to the effect that, if we can only get a cheap fish supply, the question of the fishing population is a secondary one. I do not think so; the fishing population is a large one, and a very important one for the Naval Reserve. It forms a large and a powerful part of it, and I am afraid there is some danger, if the question of the fishing trade is treated only from the point of cheap fish supply, that it may decrease; for I understand that the trawlers have driven away some of the fishing population from smaller places on the coast, by being unable to compete with them. The fishing population are the peasant farmers of the sea, and it is impossible for them, under the conditions in which their business is carried on, to provide themselves with the necessary harbours for the purpose. Moreover, one great harbour of refuge will not meet all their wants. What they require is, that several harbours along the coast should be improved, because the fishing-boats have to follow the shoals of fish as they move along the coast. That want, of improving the several harbours, will be to a great extent met by the Committee of the House of Commons, which is now sitting, a part of whose consideration is, I believe, to enable the local places to borrow money at cheap rates from the Government in order to improve their own harbours. Another point for the benefit of the fishing population is getting the fish to market easily. For this purpose I quite agree that Filey comes in for very important consideration. It is not only near one of the

great fishing banks, but it is within reach by railway of some of the great centres of population; and on that point I may mention that a fish wharf, established at Hartlepool not long ago by the North-Eastern Railway Company, has grown to very large dimensions, mainly, as I have been informed, because the fishermen say that they can make three voyages from the Dogger Bank to Hartlepool for every two they would make to Grimsby, and therefore they get a quicker market for their fish. But to make Filey properly available for this purpose the railway communication would have to be improved. With respect to the war requirements in connection with harbours of refuge, the only point I wish to draw attention to is the guarding of the coast by cruisers, and the consequent necessity of having coaling harbours for them. There are at present no really good coaling harbours upon that coast. Although the Tyne and Tees may be available to some extent, they are not always so. Now this is a question that tells very much in favour of Filey, because the great trade lies between the Humber and the Tees and the Tyne and the Forth. That is where cruisers would have to be to guard it, and at some points near those centres of traffic you would require to have more accessible coaling ports for the cruisers to resort to.¹ This, however, is quite a distinct question from that of strategical harbours proper. With respect to the employment of convicts upon these works; if Dover is taken up, that will employ a considerable number of men, but still, as I understand, there will be a large number available for other work, and therefore it would be quite possible to carry on a second harbour of refuge at the same time with Dover. It will be a question of getting money to do it, and not a question of providing the convict labour. As the Home Secretary very pithily said with reference to this question, there are several large spending departments of the Government which require a great deal of labour, and there is one department of the Government which has the labour to supply, and the question is to bring them into contact with each other; and, if Parliament would only give the money, that cannot be done in any better way than by carrying on as many harbours of refuge as you have convicts that can be satisfactorily employed upon them. I do not expect there will be much saving to the Government eventually in the employment of convicts, if you take into consideration their maintenance; but then we must recollect that the convicts must be maintained wherever they are; and if we leave out the cost of maintenance and the cost of the necessary prisons, then there would certainly be a saving, by all the experience we have had, of from one-fourth to one-sixth of the cost of free labour. I have only one thing more to mention, and that is with reference to Peterhead. Although the evidence is very strong in favour of having the next harbour at Filey, there has been a great pressure put upon the Government to construct one also at Peterhead, mainly with the idea of employing the Scotch convicts upon it. Now I venture to think that would be a mistake both for the benefit of Scotland and of the country at large. It seems to me to be very doubtful whether it would be advantageous to have a large harbour of refuge at Peterhead. It can hardly be said to be required for the great ocean traffic, as there is very little traffic that goes round the north of Scotland; and it cannot be said to be required as a strategical harbour, because although we are tolerably well agreed about the advantages of having a strategical harbour on the coast of Yorkshire, I do not know that anybody at the present time is strongly in favour of one at Peterhead, or, indeed, any further north than Filey; and it would certainly not be so great an advantage to the fishing population as would the improvement of several harbours along the coast.

¹ In addition to the above, it will probably be interesting to record the following statistics of the trade at the north-east port, as it affects the question of the position of coaling ports for cruisers:—

I. Approximate value in millions of pounds sterling per annum of sea traffic inwards and outwards—Humber, 53; Tyne, 17; Forth, 12; Tay, 4; ports north of Tay, 2.

II. Approximate tonnage in millions of tons per annum, inwards and outwards. This may fairly be considered as a measure of the number of seamen employed—Humber, 7½; Tyne, 12; Forth, 5; Tay, 1; ports north of Tay, 1½.

Sir DIGBY MURRAY, Bart., Board of Trade: There is one point in the lecture which has not been, in my opinion, sufficiently noticed, and that is the distinction between harbours of refuge and life harbours. I think it must be quite clear, at all events Colonel Nugent's lecture has convinced me if I required conviction, that the establishment of a number of deep-water harbours along the coast in various directions, easy of access, and not fortified so as to render them equal to their own defence, would be a source of very great weakness to this country, especially looking to the number of ironclads that would be likely to be available for the defence of the coast in time of war. Every such harbour, if it was not capable of self-defence, would require to be watched, and where are we to get the fleet from to watch them? I think that Colonel Nugent made a proper distinction between a large military harbour which should be capable of defending itself and smaller life harbours in shallow water which might be available for our fishermen to run into in case of need, but which at the same time would not be capable of harbouring an enemy's fleet.

Mr. F. JOHNSON, Secretary National Refuge Harbour Society: At this late period of the discussion I propose only to make a very few remarks. The point I shall allude to particularly is the question of convict labour. I think it is beyond all dispute that harbours of refuge are needed; the question is, how are we to get them? We have but three resources, the first is by Government grants, the next is by national loan, and the third by convict labour. In the present state of public opinion it is quite clear that we are not likely to get anything by public grant. If you are to get any harbours generally round the coast there is the very greatest difficulty in getting them by public loan, and for this reason Government has already decided that it does not wish to interfere with the Loan Commissioners. The Loan Commissioners are responsible for the money which they lend, and they do not wish to make any bad debts, and therefore in places of the greatest necessity it is impossible to get a loan as they cannot give approved security; the consequence is we are entirely left to convict labour; we have no other present resource. There is no question about it. The resource which is left is an inferior one, and one that, by itself, we cannot expect to get a very large amount out of, but as it is the only resource we naturally fall back upon convict labour. Now, we were told the other day by Mr. Chamberlain that it was from the ranks of the fishermen that we obtain British seamen, who are the defence of our Kingdom, and I think, considering that we have drowned in the last twenty-four years 20,000 men, one of the greatest strategic problems we have to face is how to preserve as large a number of these lives as possible to oppose any enemy which unfortunately might threaten us. Colonel Nugent tells us that on the French coast they are making important harbours, and are setting us an example; but there is one point must not be lost sight of, and it is this fact, that the whole of the harbours on the French coast are State property, which is not the case in our own country. It certainly is a thing which has impressed itself upon my mind that we should have to take an example in that respect from our neighbours the French, because at the present moment almost every locality is doing everything that it possibly can to get its own members of Parliament to advocate its own particular personal interests, and as long as it is advocated in that way the national point of view is set on one side, and after the Committee which is now sitting in the House of Commons has completed its task we shall have the whole of these particular interests that have been promoted by constituents, and not from a national point of view, brought forward, Government will be embarrassed, and we shall be placed in the same position that we were in some twenty-three years ago, when the last Royal Commission sat upon this question.

Admiral BOYS: Had time permitted I should like to have made a few remarks on the subject of the paper. I will now only detain you one or two minutes. I have had the pleasure of being associated with Sir Charles Nugent for some years on duty of different kinds, and I know that there is no one that the Council could have selected who would have been better able to deal with this subject. There is one condition of a harbour of refuge which appears to me has not been referred to. It is that we must not consider that a harbour of refuge is only a harbour for our mercantile navy to resort to in case of stress of weather or on account of being disabled. It is very probable that in the future, should we unhappily be engaged in

war, that an enemy's cruiser, like the "Alabama," might drop on our coasts unawares, especially on our exposed east coast, with the object of destroying our coasting trade and shipping. Then, what are our vessels to do? They will have to make for the first place they can reach to seek for protection, and that must be a harbour where their enemy cannot follow them. It appears to me on the east coast Filey is exactly that place. With regard to the question of the Tees *versus* Filey, I would simply point out that the subject of this lecture is harbours of refuge in connection with convict labour. It is clear the mouth of the Tees is not a suitable locality for a convict establishment. If Filey did not exist, then I should say let us have a harbour of refuge at Tees Bay; but as Filey does exist, it is, in my opinion, unquestionably the best position for a harbour of refuge on that coast.¹

The CHAIRMAN: Before asking Colonel Nugent to reply I wish to make one very brief remark, although it refers to a point that has been touched upon by Sir John Coode. I do not think Sir Charles Nugent's description of the Tyne is quite accurate in the present day. The Tyne Commissioners have spent very large sums of money in improving their harbour, and it is hardly accurate to call it a "narrow outlet of a small river, and no vessel could attempt its entrance in certain weather, or could remain in it if it succeeded in entering." Now, as to the entrance to the Tyne, there is never less at the lowest spring tide than 21 feet of water. I think it is a very fair harbour if a navigator knows his position, and is brave enough to run straight in for it with an easterly gale. Of course, a steamer might do that with more impunity than a sailing vessel, but I thought it only fair to the Tyne Commissioners to mention that their harbour is now a very fair harbour, with 21 feet as the least depth at the entrance. I was also going to ask Sir Charles, although it is perhaps hardly fair to ask him to undertake any further labour, whether he could by any means put a little more prominently than he has done the number of ships actually lost on the east coast as distinguished from those that are injured by collisions. As I understand from the figures he has brought before us, and they are very formidable in any way we take them, a great number of the casualties are collisions, and of course have no connection with the question of harbour or no harbour. With these few remarks I will now ask Sir Charles Nugent to reply.

SIR CHARLES NUGENT: I will endeavour to reply as briefly as I can to such observations as have been made upon the paper which forms the subject of our meeting. Some of my hearers, perhaps, did not understand that, practically, the paper only dealt with one class of the harbours which formed the subject of the Report of the Royal Commission of 1859. It seems to me that with a view to define their ground clearly, they made, I will not say an unwise distinction, but a distinction which had not previously received acceptance, and that what previously had been generally understood by Harbours of Refuge, viz., great harbours which ships might make for at any time and in any weather, they do not call Harbours of Refuge. Indeed, I have often been puzzled in reading their Report to keep the facts of it clearly before me, my mind so far having been prejudiced by the common acceptance of the term Harbour of Refuge.

It is perfectly true that much time will be expended if we employ convicts, and looking at the matter at the present time, and feeling how great the need is for harbours of refuge, it, no doubt, seems hard to have to wait, but I fear that that is almost inevitable, and as we have waited in the past, and have after all obtained the result we so much desired, I can only counsel patience in this matter. Captain Swinburne referred to the Tees. I can only say, I am not a

¹ Had time permitted I should have said that I could not agree with the proposal for a harbour of refuge at Lundy Island. It is situated in the midst of the strong tides of the Bristol Channel, surrounded by tide races, which any solid structure in the water would increase and make it too difficult for disabled ships to enter, besides it would be cut off from all outside resources, which is made a necessary condition for a harbour of refuge. With Dover in hand and Filey to come I think we may well leave the question of Lundy Island to be discussed and decided by another generation.

nautical man, and my opinion is not worth much, still I had the good fortune to be associated in the examination of that coast with several very able seamen, Admiral Phillimore, Admiral Boys, and Sir Digby Murray, and others, and although we were able to devote but a limited time to the investigation of some of the Harbours, yet I believe we went to them all. I afterwards went down to examine them myself alone, and my opinion coincides with that of Admiral Boys, who said that Filey is far beyond Tees Bay or Sunderland. In reply to Admiral Ommanney it may be that at the present time convict prisons afford us no good return, and personally I am unable to say what good we have got out of Dartmoor Prison beyond the penal restraint of the prisoners. As far as labour for the nation is concerned I cannot say that we have got much; but I have no experience in this matter, and I did not enter upon this subject with any intention of taking it up. My object was not to show what could be done with prisoners everywhere or how they could be best treated, but simply to point out that certain forms of labour, such as harbours of refuge, were very suitable for the application of prison labour. I would stop for a moment to say how very kind it is of Sir John Coode to speak of me in the flattering way in which he has done, and it is a real pleasure to me that after some years of separation he should retain so kindly a remembrance of me. I am bound, also, to say, that with regard to General Collinson, he has spoken of me in far too favourable terms; indeed, both he and Sir John Coode unwittingly were praising themselves, for, as I have already told you, I have availed myself largely of their labours in this field, and no doubt much, perhaps most, of what is good in my paper comes from them. Sir John Coode did in a certain measure answer Sir Frederick Nicolson, for he said of the Tyne, that with a heavy tide and strong easterly gale you could not make the harbour.

Sir JOHN COODE: Not quite that you could not make the harbour, but that it was very awkward for a small vessel to make.

Colonel NUGENT: I accept the correction, and am also very glad to find that Sir John Coode's experience in the employment of convict labour so much agrees with mine. Of course labour of this kind should not be placed in competition with free labour, and he very early made a point which I had omitted, and that is, that this very form of labour is the form of all others which does not clash with free labour at all. With regard to the remaining value of the prison buildings after the harbour works are completed, I agree with Sir J. Coode that it would be considerable, and should be taken credit for. I purposely abstained from taking credit for it, because such buildings are not useful for general purposes, and I was anxious not to state the case too favourably for the employment of convict labour. While I entirely agree with General Collinson as to the extreme difficulty of influencing the British Parliament, in which conflicting interests are so powerful, I hope with him that Dover is happily wiped out of the question. As to Peterhead, as far as I can judge, the class of trade carried on there does not justify a great national harbour, and strategically I cannot see the use of it, but I entirely concur with him in the importance of this matter to the seafaring population. Moreover, I think the only partial success, if I may say so, of the Naval Reserve, with reference to which the seafaring population must be an important element, is an additional reason why we should not lose sight of that population, but I am afraid that any attempt to keep the members of it spread all along the coast, as I understood was General Collinson's inclination, must fail, for the seafaring population will follow the law of supply and demand. If the trawlers push the seafarers, the peasant-farmers of the sea, out of the market, the seafarers will have to accept their fate, and the smaller harbours must dwindle. Sir Digby Murray referred to my want of distinction between harbours of refuge and refuge harbours, but I said at the outset of my paper I only dealt with the one description of harbour, and that I should devote very little consideration to the other, and that the particular description of harbour would be termed by me for my purpose harbour of refuge. In reply to Mr. Johnson, I think possibly we shall have to fall back on convict labour. Public grants or funds issued by the Loan Commissioners are much more hard to get. I meant to have mentioned the condition of harbours of refuge which Admiral Boys touched on. However, if I did not do so, he has laid it very clearly before you. If I ventured to differ at all, I

think I should be inclined to differ a little with Sir Frederick Nicolson about the Tyne. What I had in my mind was that it was not by any means a sort of harbour which any large vessel, not thoroughly well knowing its position, would care to make in certain weather. I spent a considerable time there, and had the advantage of having official information of what has been done by the Tyne Commissioners, and I am perfectly aware of the noble efforts which have been made, and the very large expenditure they have incurred. I have only to thank you for listening to me so patiently.

The CHAIRMAN: I have only one other duty to perform, and that is to return our grateful thanks to Sir Charles Nugent for this very able and interesting paper. It is manifest from the mass of figures and diagrams he has brought before us that he has expended a very considerable amount of labour in preparing his lecture, and I am sure we are all deeply grateful to him for bringing it before us.