Channel Tunnel.

DEPUTATION TO THE PRIME MINISTER.

Full Details of the Present Scheme—Military, Engineering, Financial.

Special Articles by

Rt. Hon. LORD SYDENHAM, formerly Secretary to the Committee of Imperial Defence.

M. ALBERT SARTIAUX, Chief Engineer for Roads and Bridges to the French Government; also General Manager, Northern Railway of France.

The Late General Sir WILLIAM BUTLER, G.C.B.

Major-General Sir ALFRED E. TURNER, K.C.B., late Inspector-General, Auxiliary Forces.

Lieut.-Colonel ALSAGER POLLOCK, Special Correspondent of the "Times" in the Boer War.

Commander E. HAMILTON CURREY, R.N.

Food Supplies in Time of War.

Benefit of the Channel Tunnel to British Trade:
The late Sir ROBERT GIFFEN'S Evidence.

Opinions of the Press.

EDITED BY
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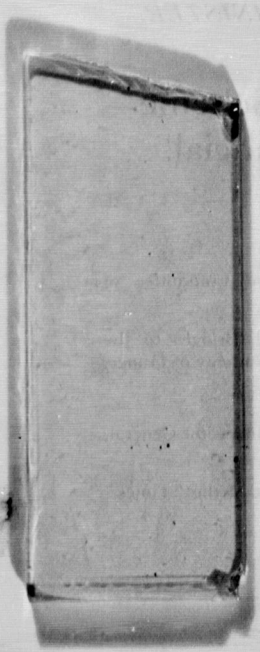
December, 1913.



Printed by
A. & E. WALTER, Ltd.,
13 to 17 Tabernacle Street,
LONDON, E.C.

INTRODUCTION.

This pamphlet is issued while the Channel Tunnel Scheme is under the consideration of the Committee of Imperial Defence, with the object of bringing together, in convenient form, particulars for which on the part of the public generally there is now an ever-increasing demand. It will be remembered that the project was revived early in the present year, when His Majesty's Government called for special reports upon the subject from the three Departments immediately concerned—Admiralty, War Office, and Board of Trade. These reports have to be presented to the Committee of Imperial Defence. That body will, in turn, make to the Cabinet recommendations upon which the decision of the Government will be based, and announced to Parliament in the session of 1914.

Attention is herein directed to the several inquiries, which, in April last, Mr. Arthur Fell, M.P., addressed to the Prime Minister, and the replies of Mr. Asquith are appended. A verbatim report follows of the proceedings when a deputation, representing all political parties in the House of Commons, waited upon the same right hon. gentleman, and urged that the proposed submarine railway between England and France should be constructed as soon as possible.

In view of the fact that the only opposition now offered to the Channel Tunnel is based upon the Memorandum laid, in 1883, by Lord Wolseley before the Joint Select Committee over which the Marquess of Lansdowne presided, the document is reproduced *in extenso.* Even at that time the fears expressed by Lord Wolseley were not shared by the Military Committee (headed by Lieut.-General Sir Archibald Alison, Bart.), nor by Major-General Sir Andrew Clarke (Inspector-General of Fortifications), General Sir John Adye, nor General Sir Patrick McDougal. But with the successful advent of aircraft, the conditions of National defence have since undergone very material change, and many of the objections that were formerly advanced by military experts have, as a result, been removed.

One of the strongest living supporters of the scheme is Lord Sydenham (late Secretary of the Committee of Imperial Defence), who has made an important contribution to this pamphlet, and supplemented it by a Note, in which every conceivable precaution for the defence of the Tunnel is outlined. Articles by the late General Sir William Butler, G.C.B., and Major-General Sir Alfred Turner, K.C.B., (late Inspector-General, Auxiliary Forces) are reproduced, together with one from the pen of Lieut.-Colonel Alsager Pollock (who was at one time strongly opposed to the Channel Tunnel), and another by Commander E. Hamilton Currey, R.N. As an appropriate commentary by a great political leader, space has likewise been devoted to the speech which Mr. John Bright delivered in commendation of the project exactly thirty years ago. Mr. Gladstone's speech in support of the Channel Tunnel (Experimental Works) Bill of 1890, is also reprinted.

A full account of the scheme in its present shape is contained in the proceedings of the Franco-British Travel Union Congress, held in September last, when Baron Emile d'Erlanger (Chairman of the Channel Tunnel Company) dealt with its military and financial aspects, and Sir Francis Fox, M.Inst.C.E., with the engineering details. A pamphlet written and issued by Mr. Arthur Fell, M.P., on "The Channel Tunnel and Food Supplies in Time of War," is also republished, and a full translation given of a remarkable article contributed to the *Revue des Deux Mondes* by M. Albert Sartiaux, Chief Engineer for Roads and Bridges, and General Manager of the Northern Railway of France. Another from *Je Sais Tout* has been translated, and, by the courtesy of the editors, is reprinted. Articles have also been extracted from the Press of the United Kingdom, which is giving cordial encouragement to the scheme.

Finally, commercial testimony is offered, including a summary of the very striking evidence given by the late Sir Robert Giffen, of the Board of Trade, before the Joint Select Committee of 1883. If the decision of His Majesty's Government be such as to permit full inquiry into the subject by Parliament, ample evidence upon these and all essential points will be tendered by competent and trustworthy witnesses from many parts of the country.

THE EDITOR.

December, 1913.

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Questions to the Prime Minister—

House of Commons, *April, 1913.*

CHANNEL TUNNEL.

49 and 50. Mr. FELL asked the Prime Minister (1) if any communications have passed in recent years between the French and British Governments with regard to the construction of the Channel Tunnel; if the French Government still view the project favourably; and (2) if the question of the construction of the Channel Tunnel has been before the Imperial Defence Committee recently, and if the matter is still under consideration?

The PRIME MINISTER: No such communications as are referred to have passed in recent years. I am not in possession of the views of the French Government on this subject. No detailed examination of the Channel Tunnel project has been carried out by the Committee of Imperial Defence since February, 1907.

Sir W. BYLES: Could the right hon. gentleman say whether our Government is favourable?

The PRIME MINISTER: No, Sir, I cannot say either "Yes" or "No."

[OFFICIAL REPORT, *9th April*, 1913.]

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53. Mr. FELL asked if the question of the strategic advantages which may follow from the construction of a Channel Tunnel between England and France has been before the Committee of Imperial Defence recently?

The PRIME MINISTER: As I recently informed the hon. Member, no detailed examination of this project has been carried out by the Committee of Imperial Defence since the early part of 1907.

Mr. FELL: Might I ask if it has come before them in any form, and not only for detail examination?

The PRIME MINISTER: I do not think it is very desirable to answer that kind of question. There are many confidential matters which come before the Committee of Imperial Defence. It has not been seriously considered since 1907.

Sir W. BYLES: Might the House of Commons and the public know whether the Government of the country is favourable or unfavourable to the scheme?

The PRIME MINISTER: Certainly not in answer to a supplementary question.

[OFFICIAL REPORT, *14th April*, 1913.]

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49. Mr. FELL asked the Prime Minister if he will consider the proposal to submit the question of a Channel Tunnel between England and France to the Committee of Imperial Defence, so that the new conditions which have arisen, and which are considered to have changed the situation, may be considered, and the opinion of the Committee obtained before the expenses of preparing new plans and schemes for the construction of the Tunnel are incurred?

The PRIME MINISTER: The Committee of Imperial Defence is at present very fully occupied with important questions, and this matter is under consideration by the Departments concerned.

Mr. FELL: Do I understand the right hon. Gentleman to say that the matter is under consideration by the Departments concerned?

The PRIME MINISTER: Yes.

[OFFICIAL REPORT, *24th April*, 1913.]

PROPOSED CHANNEL TUNNEL.

Deputation to Prime Minister, Tuesday, August 5th, 1913.

Verbatim Report of Proceedings.

On Tuesday, August 5th, 1913, at 4 p.m., a deputation representing the Committee of Members of the House of Commons in favour of the construction of a Channel Tunnel connecting England and France, waited on the Prime Minister (Mr. Asquith) in his room at the House of Commons, for the purpose of laying their views before him and submitting a memorial on the subject.

The deputation consisted of Mr. Arthur Fell, M.P., Rt. Hon. Russell Rea, M.P., Mr. T. P. O'Connor, M.P., Mr. James Parker, M.P., Rt. Hon. Sir Charles Schwann, Bart., M.P., Mr. J. E. P. Rawlinson, K.C., M.P., Sir William Bull, M.P., Colonel Yate, M.P., Major Dalrymple White M.P., Sir William Byles, M.P., Mr. Gershom Stewart, M.P., Mr. Arthur Lynch, M.P., Mr. John O'Connor, M.P., Mr. Cecil Beck, M.P., and Colonel Greig, M.P.

Mr. FELL, in introducing the deputation, said:—

I beg to introduce a deputation from the Committee of Members of the House of Commons who have interested themselves in the question of the construction of a Tunnel between France and England. This Committee was the result of a spontaneous movement from the back benches, and it has not been engineered in any way by any of the railway companies or by the old Tunnel Company, nor are we concerned with any outside interest in any shape or form. Our object is solely to secure, if possible, that this Tunnel should be constructed. We think that it would confer enormous benefits on the commerce of the two countries, and improve the goodwill of our friends on the Continent towards ourselves, and also promote the general business of this country with countries abroad. We have nothing to gain by the project, except that we believe that it would be for the good of the country and of our trade. It is entirely a non-party Committee. We have tried to keep it as nearly as possible evenly balanced between the two parties. One day a few more may join from one side, and another day a few more may join from the other. At the present moment there are a few more Liberals on it than there are Conservatives, owing to the fact that yesterday we received a Marconi telegram from the Parliamentary party who are going round the world making a tour of the British Empire, announcing that they supported this project. I believe that there are nine members taking part in this tour, and the message was signed by eight of them, and the number of Liberals happens to be somewhat more than the number of Conservatives. That has made the number of Liberals on the Committee slightly more at the present moment, but we have tried to make them balance as evenly as possible. The Nationalists and Labour Members are also represented on this Committee.

Our only object is to get this Tunnel constructed as a non-party scheme. I may call attention to the fact that the Committee contains many members, including officers of the army, who were formerly opposed to the Tunnel, and who now support it. The reasons they give for that are these: They consider that the question of the food supply of this country in time of war is much more urgent than it was thirty years ago, when this matter was first under consideration. In fact, I have looked through the report of the evidence which was taken then, and I see that the question of food supply was never once raised in any shape, nor was it suggested that this Tunnel might be of assistance in ensuring a supply of food in time of war. We consider that the Tunnel would give another source of supply in the event of war with any other country except France, and that the knowledge that food could be obtained from the Continent if the oversea trade routes were closed to our ships would tend to avoid panic and panic prices of bread. We consider that the development of aerial navigation has altered our position as an island, and no man can say what will be the ultimate effect of this. Above all, we consider that our friendship with France, which has stood the test of ninety-eight years under varying conditions, is assured, and that the construction of the Tunnel will still further cement this friendship. We think that the suggestion that we must not improve the means of communication with our neighbours and friends for fear of invasion by them is unworthy of a great Power.

I will not refer to the military questions which were urged successfully thirty years ago, but I am informed that military opinion on the subject has greatly changed, and we have, as I have said, a number of officers' of experience on this Committee. We urge the Government to support the proposal—provided that the military requirements are carried out by the promoters. I believe that the engineers of the Tunnel, when they meet the War Office, will be able to satisfy them that they can fulfil all their reasonable requirements. We do not advocate the interests of the Channel Tunnel Company; we simply desire that the Tunnel should be built. It is suggested that the Government might possibly build it in conjunction with the French Government—or might permit the construction of it by the Tunnel Company in conjunction with the railway companies on either side of the Channel. Mr. Bonsor, the Chairman of the South Eastern Railway Company, has written me that, as far as the question of the Channel Tunnel Company, acting in conjunction with the railway companies is concerned, they would be quite ready to deposit in the ensuing Session a Bill, similar to that which was deposited in 1906 and withdrawn in 1907, if they are satisfied that the Government are willing to give it full consideration. The French Government are known to be in favour of the project, and their Prime Minister has within the last few weeks given the most explicit statement to that effect. With regard to finance, I may state that Mr. Lionel Rothschild is one of the members of our Committee, and he would have addressed you to-day, but that he has an important meeting in his own constituency which he is obliged to attend. He has, however, on more than one occasion, written to the Committee that the money for the construction of the Tunnel will be forthcoming without difficulty, being found equally in England and in France. I may read his exact words from a letter which I received this morning from him. He says:—

> "You can, of course, rest assured that what I stated at the Committee meeting is true—that the money can quite easily be found for the Tunnel by private enterprise."

The PRIME MINISTER: What is the estimated cost?

Mr. FELL: The estimate of the engineers for the double Tunnel, I believe, is about £16,000,000, of which half would be covered by shares and half by debentures. That is, I believe, the estimate; but, of course, the money would only be required as it was gradually expended over the six or seven years during which the construction of the Tunnel would last. That would be working with the aid of the Northern Railway of France, which is, I suppose, perhaps the most successful railway company in the world. Their engineer, M. Sartiaux, has been making calculations with regard to this matter, and he would be the engineer who would, I suppose, be constructing, at any rate, the French half of the Tunnel. With regard to finance, we think you may be assured that the Tunnel Company, assisted by these two great railway companies—the South Eastern and Chatham and Dover and the Northern Railway Company of France—will find the money as it is required. We hope that you will give us an assurance that the Government has abandoned the *non possumus* attitude which I have previously mentioned, and will permit this great work to be proceeded with. If you do you will certainly have assisted the most useful and the most interesting great work which has been undertaken in our generation. In conclusion, I beg to hand in a memorial signed by the members of our Committee in favour of the proposal.

Mr. FELL handed in the following memorial:—

"*To the* Rt. Hon. HENRY ASQUITH, Prime Minister.

> "We, the undersigned Members of Parliament, representing all Parties in the House of Commons, desire to call the attention of the Government to the important changes that have taken place in recent years, materially affecting the question of the construction of a Tunnel under the Channel to link up the Railways of the United Kingdom with those of France and the Continent of Europe.
>
> "We beg respectfully to urge the Government to reconsider the adverse decisions come to for strategic reasons in 1883 and 1907, and to give due weight to the new conditions that have arisen.
>
> "We hope that, in the interests of commerce and goodwill, the construction of such a Tunnel may be approved by the Government, provided due provision is made to meet the reasonable strategic requirements of the War Office as to the situation of the mouth of the Tunnel, its protection from attack in time of war, and adequate means of effectively closing it when necessary.

J. T. AGG-GARDNER	ARTHUR FELL
Maj. W. ANSTRUTHER-GRAY	Rt. Hon. CHARLES FENWICK
SYDNEY ARNOLD	W. FIELD
Sir GODFREY BARING	MICHAEL FLAVIN
G. J. BENTHAM	Sir ALFRED GELDER
A. BIGLAND	Sir DANIEL GODDARD
ALFRED BIRD	G. G. GREENWOOD
A. W. BLACK	HAMAR GREENWOOD
DANIEL BOYLE	Col. J. W. GREIG
JAMES BOYTON	WALTER GUINNESS
Sir WILLIAM BULL	STEPHEN GWYNN
Sir WILLIAM BYLES	FRED. HALL
Sir HILDRED CARLILE	Gen. Sir IVOR HERBERT
Lord ROBERT CECIL	C. SILVESTER HORNE
H. G. CHANCELLOR	HOLCOMBE INGLEBY
J. R. CLYNES	ERNEST JARDINE
Sir STEPHEN COLLINS	Sir JOHN JARDINE
G. L. COURTHOPE	Sir J. HARMOOD-BANNER
WILLIAM CROOKS	EDGAR JONES
W. DORIS	HADYN JONES
Sir GEORGE DOUGHTY	W. JOYNSON-HICKS
Dr. J. ESMOND	JOSEPH KING
BERTRAM G. FALLE	G. BUTLER LLOYD
Rt. Hon. THOMAS LOUGH	Sir ROBERT PRICE
T. LUNDON	G. H. RADFORD

Arthur Lynch	John Randles
R. McGhee	J. F. P. Rawlinson
Jeremiah McVeagh	A. Rendall
H. C. Mallaby-Deeley	Rt. Hon. Russell Rea
M. Meagher	Lionel N. de Rothschild
Philip Morrell	Arnold Rowntree
Capt. E. F. Morrison-Bell	Sir Harry S. Samuel
H. Morrison	Rt. Hon. Sir Charles Schwann
Herbert Nield	Arthur W. Soames
John O'Connor	Beville Stanier
Thomas P. O'Connor	Gershom Stewart
Thomas O'Donnell	Col. W. H. Walker
W. Ormsby-Gore	Maj. Dalrymple White
J. J. O'Shee	Cathcart Wason
Timothy O'Sullivan	Josiah Wedgwood
Jas. Parker	Sir Luke White
Robert Pearce	A. F. Whyte
Walter Pearce	Col. C. E. Yate
Capt. D. V. Pirie	W. Young "

Mr. Russell Rea: I think that there is no need for me or for anybody to speak of the advantages of this project of a Channel Tunnel. I can only say that, in my opinion, the most sanguine estimate of the commercial, social and political advantages of the Channel Tunnel between England and France are those which are nearest the truth. You have heard that there is no difficulty in arranging the financial part of the business; and the engineering problem is believed by those who have the best reason to be regarded as experts to present no difficulties. At any rate, the financiers are willing to take the risks. The only obstacle is the veto of the British Government. I remember when this subject was first raised in 1883, and I remember that a panic was organised and a memorial against it was signed; and, unfortunately, Sir Garnet Wolseley was enlisted in the opposition to the project. But at that time I had the advantage of hearing Mr. Gladstone express his strong opinion on the subject in favour of the enterprise, and declare that he did not share these alarms in the least degree. This is a military question, and we are for the most part laymen in these affairs, but I think that there are some military questions that are so simple that even the most inexpert amateur cannot fail to come to what is an adequate conclusion. I think that the problem of the defence, or, if necessary, the destruction, of thirty miles of Tunnel under the sea is one of these simple problems. When we can see Continental nations, armed to the teeth against each other, with their frontiers pierced by innumerable open-air lines, it is obvious that the military problem before us is one of comparative simplicity. For my own part, I have never felt more humiliated than when I have had to meet the amused and contemptuous criticism of French military men on this subject.

The Prime Minister: Lord Wolseley was a very considerable military authority, and he opposed the scheme. I do not know that the French military authorities could be considered as surpassing Lord Wolseley.

Mr. Russel Rea: I hope, at any rate, that you do not share these alarmist views, especially under present conditions, as we think that the opposition which formerly existed was founded on perfectly unjustifiable fears.

Mr. T. P. O'Connor: I have only to say that I am one of those who took part in the debate of 1883. I heard it all. I was in favour of the Channel Tunnel then. I was in favour of it in 1906, and I have never seen any reason to change the opinion which I have always held upon the subject.

Mr. Parker: I do not think that I need say much with regard to this matter. As far as my own party is concerned, I have not come from them, but I think that it is true to say that the majority of the members are in favour of the project. I make no claim to know anything about the military position, but I do think that it would make for the commercial benefit of the two countries and for improving the amity between them. For those two reasons I am strongly in favour of the Tunnel being constructed between the two countries.

Colonel Yate: I was formerly a great opponent of this Tunnel, but the conditions have altered so entirely during the last few years, and circumstances have so changed, that I cannot help thinking that one great advantage which we may get by this Tunnel—the advantage of being able to obtain a certain supply of food in time of war through the Tunnel—may, possibly, be greater than the disadvantage that may accrue to us from the loss of our insular position. And, therefore, it is that I join my friends here in expressing the hope that the question may be given full consideration. I take it that the question of the supply of food in time of war is a most vital one for England at the present moment. We have had a Royal Commission, but nothing has been done about it. We have had various suggestions regarding the erection of stores and elevators and other things for providing greater storage of foreign grain, and also for encouraging the farmers to grow more grain and keep the grain in storage for several months; but nothing has been done, and nothing, it seems, is going to be done. In former years our Navy was so strong that we never dreamt that we should lose the command of the Channel; but now, with floating mines and submarines and air-craft, we do not know that the Channel may not be closed at any moment in time of war. We do not know whether we could even guarantee the passage of a ship from Dover to Calais, much less keep the Channel open at all other points. This Tunnel will give us the promise of one further inlet. It is solely for that reason—to retain our food supply in time of war—that I have joined my friends in asking that the whole question may be thoroughly inquired into.

Sir William Byles: I merely wish to add this consideration: would not a link between the countries be

also a link between the peoples? And if we get to know one another better, shall not we be less liable to misunderstand each other?

The PRIME MINISTER: I am glad to have the opportunity of meeting you, and of hearing your views upon this matter. It is quite true, as Mr. Fell has said, that your deputation, and the Committee from which it springs, seem to be almost evenly representative of the different parties in the House of Commons, though, of course, the names which you have supplied do not include more than a comparatively small proportion of the total number of members.

Mr. FELL: Only 90.

The PRIME MINISTER: There are only 90 out of 670 members. I dare say you could easily get more; but whether you could or not, the opinions put forward are backed by such a representative body that they must and will receive very full consideration. You have not gone at all into the past history of this matter; but it has a history—and a very remarkable history. In the early days of this project it was favoured both by the French and the English Governments. As far back as the year 1874 the Foreign Office in this country approved—I do not say of the details of any particular plan, but of the idea as an idea—and it was at a somewhat later date, early in the 'eighties, when the military aspect of the matter and the strategic aspects came to be gone into, that doubts were entertained, and finally—I think in the year 1883—largely in consequence of the report of the Joint Committee of both Houses, presided over by Lord Lansdowne, the Government of that day, represented by Mr. Chamberlain, then President of the Board of Trade, came to the conclusion that the interests of this country would not be promoted, but might be seriously hazarded, by the carrying out of any such scheme. That opinion was founded very largely upon military considerations, and, among other authorities, the great authority—and there has been no greater authority in our time on military matters—of Lord Wolseley, who from first to last was a most determined opponent of any project of constructing a Channel Tunnel, on the ground that it would destroy the insular security of this country.

What has been the result? That from that time this scheme has been opposed and resolutely opposed by every Government which has held office. Bills for sanctioning a Tunnel have been rejected on the motion of the Government almost in every year from 1883 to 1894. The last division was taken at the instance of Sir Michael Hicks-Beach, who, I think, was at that time President of the Board of Trade, in 1890, when the Bill was rejected, and in the following years from 1891 to 1894 it was either rejected or withdrawn, without any division at all. Finally, my predecessor, the late Sir Henry Campbell-Bannerman, after the matter had been considered by the Committee of Defence, announced the decision of his Government, which was in accordance—I need not go into details—with the action taken by all his predecessors for twenty-four or twenty-five years. You are asking that that decision so arrived at, and so persistently agreed to by successive Administrations, should be reversed; and I had hoped, and rather expected, that you would produce to-day some evidence, apart from general considerations with which we are all familiar, as to the importance of maintaining close relations with our neighbours across the Channel and improving our own food supply both in peace and war, to the effect that military and technical opinion had altered since the time when Lord Wolseley announced his judgment, which as been followed in substance by all successive Administrations.

With great respect to Colonel Yate, I do not take such a gloomy view as he does. The question of our power of feeding our people, or of preserving our communications across the Channel, is a question of whether or not we have got an invincible Navy and command of the sea. As long as we have that, our food supply ought to be secure. I agree that that does not in itself conclude the matter. But when you ask me and the Government to which I belong to reverse the considered decision of our predecessors for a quarter of a century, of course that is a matter which is not to be lightly undertaken. There are, I agree, new factors in the case. One of them, perhaps the most hopeful, and in some ways the most important, is the establishment on, as I believe, a solid and unshakable basis, of friendly relations with France, because, of course, the potential enemy in the apprehensions of Lord Wolseley and those who adopted his view, and the potential enemy whose power of offence or aggression would or might be assisted by the construction of a Channel Tunnel, was always France. The possibility of such an enemy has faded away through the excellent and increasingly cordial relations which now, ever since 1904, that is to say, through a period of nearly ten years, we have maintained and continue to maintain with our friends on the other side of the Channel. There are other new factors to which Colonel Yate alluded in relation to forms of naval and military warfare and the distribution of our food supplies which undoubtedly deserve consideration, and I may say that, quite apart from this deputation and the Committee whom you represent, the matter was already receiving the attention of the Government.

Communications were passing, and are passing from time to time, between the various departments concerned, and I think, with regard to all these large strategical questions, that it is desirable they should be from time to time reviewed in the light of new facts, where there are new facts, by our best expert authorities—in this case the Committee of Imperial Defence—in order that the Government on whom the ultimate responsibility rests, may be able to consider, in the light not merely of past authority but of existing conditions,

what are the best interests of the country in the matter. That review will take place. Indeed, it is in the course of prosecution at the moment. I cannot anticipate what its results will be, because I have not yet got the materials upon which to form a judgment, but I do not think that I can say more to you than that the matter is engaging our attention. We shall approach its consideration, as we do all these questions, with an unbiassed mind, though of course not without proper deference to the long chain of authority which in this case supports a particular conclusion, but with unbiassed minds, and with the single desire to secure on the one hand the absolute strategical safety of the country, and on the other the largest, freest possible outlet for trade and inlet for food supplies and raw material, on which the industries of the country so largely depend. That is the actual state of the case as far as the Government is concerned. I cannot say any more at this moment, except that I will give respectful consideration to what you have said, and to the points which you have brought before me.

Mr. FELL: We thank you for having received us, and I have only to say that in reference to the military aspect of the question, to which you have referred, we have evidence that a change has taken place, and, should you desire it, we could place it before you; but we know that the matter is in your hands, and that you can obtain the advice of the best experts.

The deputation then withdrew.

While crossing the Atlantic to Canada, the Parliamentary Party, who were *en route* to Australia on a visit to the Commonwealth branch of the Empire Parliamentary Association, read the news by wireless that the Prime Minister would receive this deputation. The majority immediately communicated with Mr. Fell, desiring to be identified with the movement, namely, Sir Hildred Carlile, the Right Hon. Thomas Lough, Sir Stephen Collins, Mr. A. W. Black, Mr. Pirie, Mr. Hamar Greenwood, Mr. Edgar Jones, and Mr. Will Crooks.

On August 7th, 1913, the Parliamentary representative of the *Daily Graphic* published the following:—

"Mr. Fell, M.P., the chairman of the Channel Tunnel Committee of M.P.'s, is not at all cast down by the Prime Minister's guarded reply to the deputation on Tuesday. 'We quite recognise,' he says, 'that the Prime Minister could not go further in the present circumstances. The fact that the question is being considered by the Government, and more especially by the Committee of Imperial Defence, is extremely satisfactory to us. We are confident that when the engineers of the Tunnel come to meet the Committee of Imperial Defence, they will be able to satisfy the military and naval experts that safeguards against invasion by the Tunnel would be most amply provided, so that the position of the country would not be affected in the slightest degree for the worse."

BARON EMILE D'ERLANGER
Chairman, Channel Tunnel Company, Limited.

THE CHANNEL TUNNEL.

Support to the Channel Tunnel at the First Congress of The Franco-British Travel Union.

FULL DESCRIPTION OF PRESENT SCHEME.

The First Congress of the Franco-British Travel Union was opened in Marble Arch House, W., on Tuesday, September 23rd, 1913. First in order for discussion was the subject of the Channel Tunnel. Longitudinal sections and cross-sections of the proposed Tunnel (prepared by Mr. P. C. Tempest, Chief Engineer to the South Eastern and Chatham Railway) were displayed upon the walls, together with sections of the work successfully carried out in the Simplon and Mersey Tunnels, with both of which Sir Francis Fox was professionally connected.

LORD MONTAGUE OF BEAULIEU presided, and there was a large attendance, those on the platform including M. de Coppet, Consul-Général de France; Professor Schatz, representing the Institut Français; Dr. Gilhaud, representing the French Minister of the Interior; M. de Galland, Mayor of Algiers; M. Hannedouchet, representing the Goverment of Algiers and Morocco; M. Alfred Sire, London representative, Northern, Eastern and Orleans Railways of France; Sir Albert Rollit, representing the London Chamber of Commerce; Mr. W. Hanning, President of the British Chamber of Commerce in Paris; M. Georges Lévy-Caen, Hon. General Secretary of the Congress; Sir J. Roper Parkington; Mr. Barton Kent; Dr. Perret, representing the Syndicat d'Initiative du Jura; and Mr. E. Freshfields Touring Club of France.

M. DE COPPET delivered the opening address, in which he indicated the extent to which touring by English people in France and French people in England had been developed by the establishment of the *entente cordiale*, and the benefits to be gained by both countries by still further advances in this direction. The Congress had put the question of the Channel Tunnel in the forefront of their programme, but he trusted that his countrymen would not wait for the Tunnel to be built to increase the number of their visits to England.

The Chairman, M. Schatz, M. Sire, M. Hannedouchet, Mr. Freshfield, Dr. Perret, Dr. Guilhaud, and M. de Galland having addressed the meeting in support of the objects of the Congress.

M. LÉVY CAEN read a paper on the development of the tourist traffic, in the course of which he examined the statistics of the traffic between England and France, and indicated how small that traffic was in volume compared with what it would be if the facilities for communication between the two countries were improved. The well-known paper *Le Temps*, dealing with this subject recently, expressed the opinion that the insufficient intercourse between France and England was due to the fact that the means of communication existing at present were what the Americans would describe as "archaic." In the same article *Le Temps* approved of the scheme to construct a tunnel under the Channel connecting France and England, and this approval was shared by every one in France. The Channel Tunnel scheme was placed first among the subjects to be discussed by the Congress. As Secretary-General to the Congress he was precluded by his position from prejudging the result of their deliberations, but the importance of the subject was apparent to all.

Sir ALBERT ROLLIT, LL.D., D.C.L., Ex-President of the Association of Chambers of Commerce of the United Kingdom, as also of the London and Hull Chambers, and formerly a Director of the British Chamber of Commerce in Paris, said he had been asked to propose a vote of thanks to the dual chairmen (Lord Montague of Beaulieu and M. de Coppet). He took the opportunity, first, of supporting the objects and action of the Congress and the Union in relation to the Channel Tunnel, the piercing of which he regarded as absolutely necessary to Travel and Tourism, and which would be a new link of friendship and goodwill binding England and France, between which, the two great civilised and cultured nations of Western Europe, comity and concord ought always to reign, and so conduce to their joint progress and prosperity—(applause). Knowledge of each other's peoples was essential to this aim, and intercourse was essential to knowledge, which was also the basis of

commerce and business. These the Tunnel would vastly increase. His own Channel motto was "*Sic—transit gloria mundi*"—(laughter). Moreover, the Tunnel would advantage Tourism by opening up both countries to Travellers and Tourists—the two fairest lands on earth—Old England and La belle France—(applause). France he knew well, and was a resident there for some years, paying his rates and taxes as a French citizen. Moreover, France was the country of origin of his family—at Lyons, and he had travelled over most of it—Northern France, round and about Lille, where were object lessons on our land question through *petite* culture—(hear, hear)—within the last few days. Some most interesting districts offered themselves to much greater development—for instance, Biarritz, Bordeaux, the Medoc and the neighbourhood, which he visited in the International Exhibition year of 1895, and where, under the auspices of the Lord Mayor, Sir Walter Gilbey, Sir Roper Parkington, himself, and others, the first ripples of the *Entente* were set in motion, to become great waves of human feeling a few years afterwards. The country of the Gironde, with its picturesque and attractive Chateaux and their matchless wines—the very essence of sunshine—(applause)—as also Pau and the Pyrenees, with their excellent roads, and mule and footpaths into Spain, their cirques, bréches and lakes, like the romantic little Lac de Gaube, were most attractive. Such scenery was entrancing, and not less so were the people of France, including the French fair ladies—(applause)—who conquered hearts and minds, and under whose genial sway Englishmen were apt to fall, of whom he would only say that if they became captives, he hoped they would always be able to plead with truth the couplet:—

Je n'ai pas quitté Pachita;
C'est Pachita qui m'a quittée

—(laughter and applause). Winter sports were, he believed, now established at Bagnieres-de-Bigorre, but, generally speaking, there were many centres where they might be greatly developed, and made attractive to visitors to Pau, Eaux Chaudes, Eaux Bonnes, Luchon, Vernet-les-Bains, etc., but much more organization was required for success. As to hotels, too many reminded him of his late friend Lord Morris, whom he once asked which was the best hotel in Galway. In his rich Irish brogue, Lord Morris replied, "There are only two, and whichever you're at, you'll wish you were at the other—(laughter)—so come and stay with me at Spittal"—which was near Galway. He proposed most cordial thanks to their twin chairmen, Lord Montagu of Beaulieu, Chairman I., whose name was by a coincidence half French, which reminded him that the British could not pass an Act of Parliament without using their old French language—"*Le Roi le veult*," or—as was once, but not now, possible, on the King pronouncing his mild Veto—"*Le Roi s'avisera.*" Chairman II. was French—their most able and tactful French Consul-General M. de Coppet—to both of whom and to Madame de Coppet and the ladies, French and English, was due their most cordial appreciation—(applause).

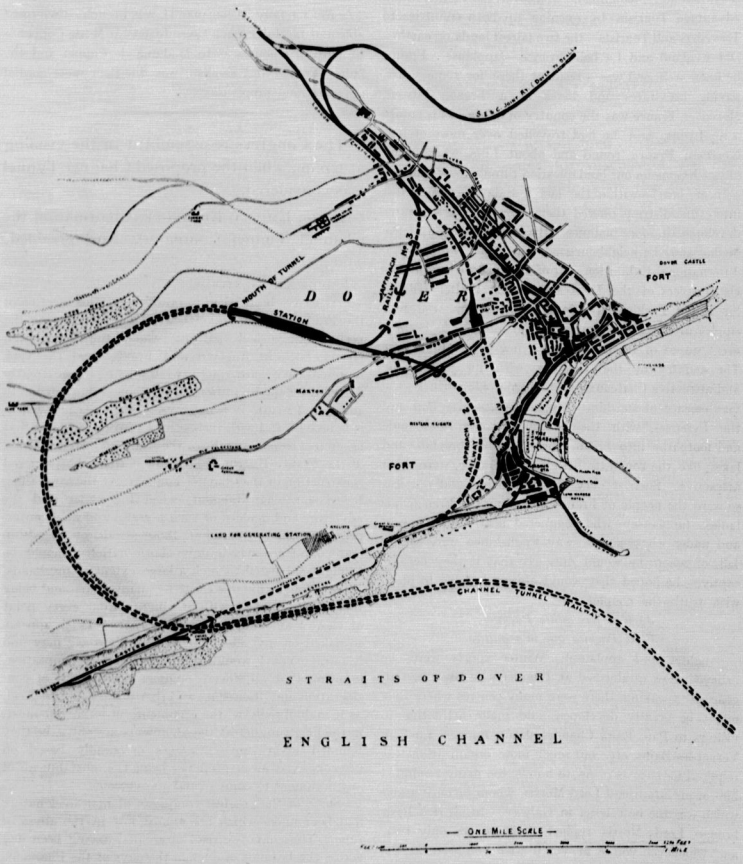
The Congress re-assembled in the evening at 9 p.m., when the proposed Channel Tunnel was considered.

Baron EMILE D'ERLANGER (Chairman of the Channel Tunnel Company), who presided, said:

LADIES AND GENTLEMEN,

I have been asked to preside over this meeting of the Franco-British Travel Union, and, considering the very distinguished patrons which the Association boasts, both in England and France, and the very representative gathering here to-night, I feel greatly flattered by the invitation. Pray, however, allow me to add that I realize it is not myself, but the cause, which is honoured, and with justice, for I venture to assert that no subject is more worthy of the study and close scrutiny of the Franco-British Travel Union than the proposed construction of the Channel Tunnel. At the same time, I feel somewhat diffident, when I consider that the advocacy and defence of such a grand and noble enterprise, destined to cement those bonds of friendship and confidence which unite both nations, should be to-night entrusted to such a large extent to my hands. Having fought for this cause for many years, and being thoroughly imbued with its merits from every point of view, I am tempted to think that, "Truth appears so naked on my side, that any purblind eye may find it out." Yet I would fain resist such a temptation, knowing that all sincere opinions are worthy of consideration and discussion, and that if the cause be good, as it undoubtedly is, the arguments in its favour must, in the long run, defeat the arguments in contra, be they founded upon apparent facts or simply based on pre-conceived ideas, prejudice being the most difficult of any argument to combat and to overcome.

Some of the greatest conquests of man over nature had beginnings which are almost lost in the abyss of time. Thus have we read of a canal having been dug across the Isthmus of Suez in the days of the Pharaohs. Then again the idea of cutting through the Isthmus of Darien was conceived centuries before its realisation entered into the sphere of practicability. Leonardo da Vinci was the forerunner of the Wrights, of Santos Dumont, of Latham, Blériot, Cody, and other heroes



Map showing the proposed Channel Tunnel Railway Connections at Dover.

of the air, to whose prowess indirectly we shall owe the construction of the Channel Tunnel.

On the other hand, the conception of the Channel Tunnel is so modern as to almost belong to contemporaneous history. The idea was first suggested to the great Napoleon by Mathieu, in the early part of the last century, soon after the Peace of Amiens. The Emperor, speaking to our Ambassador, said "C'est une des grandes choses que nous devrions faire ensemble." It is my fondest wish to live to materialise those words. The scheme, however, only took concrete form in the early "sixties" under the leadership of Thomé de Gamond, and received the support of our late venerated Queen Victoria and of the Prince Consort.

In the year 1870 the first negotiations were entrusted to Lord Clarendon and the Marquis de Lavelette, and were concluded by Lord Derby and Count de Jarnac. They resulted in a Committee of eight members being appointed, and in 1876 a Protocol was signed by the representatives of both countries. I must dwell with you for a few moments upon this phase of the subject, for it is significant that the Channel Tunnel scheme is the only one of the fundamental innovations in the domain of transport engineering which has not been most strenuously opposed *at the outset* by the great Englishmen of the age. Need I remind you that steamboats were to be the "ruin of our supremacy at sea," that the Iron Duke looked upon Railways as no less disastrous an innovation, and that Lord Palmerston, one of many others, had not a word except of blame for the Suez Canal—"a madcap scheme which would be the ruin of our Indian Empire were it possible of construction, and which would spell disaster to those who had the temerity to assist it."

Fortunately for mankind, neither De Lesseps nor the Emperor Napoleon III. was to be swayed by these considerations, and, more fortunately still, at a later date Disraeli, with consummate ability and the commercial instinct inherent to his race, repaired the error of the past, so that the two great friendly nations derived mutual commercial benefit from this enterprise and mutual financial profit, even though only one of them, France, can claim the glory of its fatherhood.

It is also worthy of notice that when the barriers of opposition had once been removed from any of the innovations, the English nation was the foremost to bring them to their very highest standard of efficiency, and to reap therefrom the richest harvest.

There was, I have said, a time when the Channel Tunnel scheme met with no official or private opposition in England, and may be that opposition would never have been aroused had it not been for the rivalry between the English Railway Companies which then contended for the Continental traffic. But let that pass, and allow me to retrace our steps for a moment.

In 1876 as soon as the diplomatic arrangements had been concluded, the French Company was formed, and it obtained from the French Government for the work on the French side a concession which was officially communicated to the English Government.

I may here mention that the French Company has an exclusive concession for the Tunnel on the French side, which concession is still valid to-day and that Company, which is under the auspices of the Northern Railway of France and Messrs. Rothschild, has always worked in harmony with the English Channel Tunnel and the South Eastern and Chatham and Dover Railways, so that the English Channel Tunnel Company is the only recognised body to whom the concession could be granted, and the only Company which could carry out the construction of the Tunnel if the scheme were approved.

The French Company actually bored over 2,000 yards of Tunnel. Meantime, a similar policy was followed in London. The Channel Tunnel Company was formed, and obtained an Act enabling it to carry on experimental operations in St. Margaret's Bay. Nothing, however, was done under that Act. It was the South Eastern Company which, under a similar Act of Parliament, sank a shaft near Shakespeare Cliff, and from it bored a tunnel for a distance of 2,015 yards.

These works were subsequently taken over, and paid for by the Channel Tunnel Company now existing. In July, 1882, the hopes of the promoters of the Tunnel were dashed to the ground and operations suspended by an order of the Board of Trade. Since then, numerous attempts have been made to obtain the consent of Parliament to resume the work. The last was made in 1907, when, finding that the Government was opposed to the scheme, the Bill was withdrawn. Let me repeat that, at a cost of something over a quarter of a million sterling, over 4,000 yards of tunnelling have been made, over four thousand soundings have been taken from shore to shore, and all the elements are to hand to enable work to be promptly resumed, and carried to a successful issue. We understand that the matter is now before the Committee of Imperial Defence, and we look forward with confidence to the decision of that body, by which the Government will be guided.

In order to justify our confidence, I must put before you the strategic, economic, and financial arguments upon which it is founded. I must give you in as few words as possible, the outline of the Channel Tunnel scheme from a technical point of view, although I will trespass as little as possible upon the ground which will be covered by my friend Sir Francis Fox, who is far more competent and able than I am to explain its technical points.

The Tunnel will be double-barrelled, bored throughout in the grey Chalk Stratum, which extends from

coast to coast and has an average thickness of about 80 feet. Above the impervious grey chalk strata there is more than an ample thickness of rock between the Tunnel and the bed of the Channel to sustain the weight of the water, which is not very deep, the greatest depth between Calais and Dover being about 150 feet.

The entrance to the Tunnel on the English side will be in the valley behind Dover Castle, where it will be fully exposed both to the direct and plunging fire of the forts, and further defended by such additional precautionary devices as the Defence Committee may recommend. Thence the Tunnel will dip under the Channel for a length of 24 miles, and emerge at Sangatte, near Calais. Twelve miles of Tunnel will be constructed by the English Company, and 12 miles by the French Company. A large power station will provide the motive power for the trains, as well as electricity for lighting, compressed air for the purpose of ventilation, and pumping if necessary. The total cost of the whole undertaking, including the construction of the Tunnel, the purchase of land, interest during construction, and the purchase of rights and plants existing on the English and French coasts, is estimated not to exceed £16,000,000 sterling, of which, £8,000,000 will be provided by the French Company, and £8,000,000 by the English Company.

It can hardly be contended—or at least I hope there are no grounds upon which the contention could be supported—that the forts round Dover are not in a position to hold the mouth of the Tunnel against invasion, and to render it unserviceable. I am reluctant to believe that any English Government would have neglected to take the fullest precautions to safeguard Dover, now a great naval harbour, against capture, in the event of an attack being made upon that station during the absence of the Fleet. Indeed, should Dover Harbour be held by the enemy, the surrounding country, Tunnel or no Tunnel, would be open to the invaders. Now, if the forts round Dover are such that they can successfully defend not only their own positions, but Dover Harbour as well, how much more easily could they defend or disable a small work of art like the entrance to the tunnel? Even given a successful seizure, the position would be untenable under the concentrated fire of the forts, and that action would give plenty of time to render the destruction of the Tunnel more permanent.

The holding of the mouth of the Tunnel by the enemy for a short time would be of no assistance whatever to the invaders, inasmuch as to transport an Army Corps by means of the Tunnel, it would be necessary for them to hold the surrounding country for many miles inland, and to have at their disposal tracks and sidings to disembark the troops and to stable the empty trains. The bogey of invasion by an act of surprise may, therefore, be dismissed; and it is dismissed to-day by the best military critics, as a chimera.

If Dover and the surrounding country were conquered by the enemy and held for any length of time, Tunnel or no Tunnel, the country would be open to the invaders. Yet, though my words are sure to be misquoted, it is only fair to state that in such case the possession of the Tunnel would be of distinct advantage to the invaders. Therefore, it is not sufficient to rely on the disablement consequent upon the bombardment and battering in of the entrance. Precautions must be taken for a more permanent stoppage, but this is child's play for the engineers.

It might be made part of the Convention with France that the only power station working the tunnel should be under the command of the Dover forts, near Dover itself, so that, if it were blown up, the traffic would be interrupted. In the event of this single power-station being erected, it ought not to be located between the forts and the mouth of the Tunnel, but at the back of the forts, so as to make its destruction a greater certainty in case of need. Furthermore, the Tunnel could be flooded, and it would take months to pump it dry, while the land approaches could be destroyed over a considerable distance, so that it would take a year or more to repair the damage.

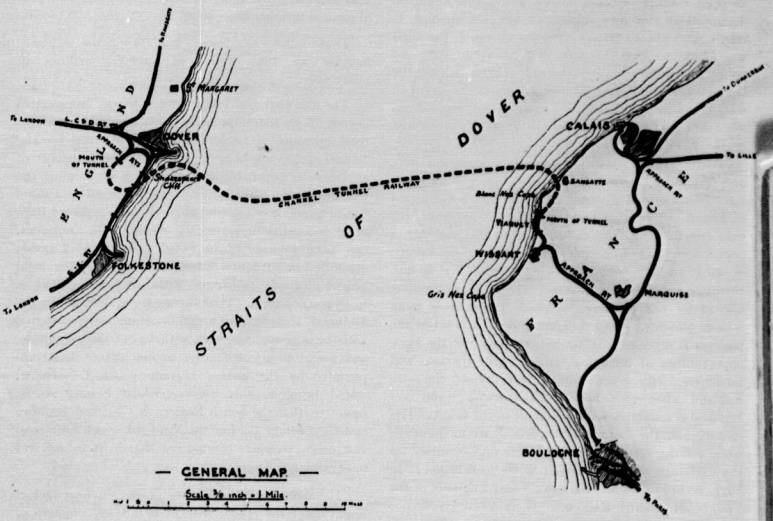
It has also been suggested that the approach to the Tunnel should consist of a large viaduct, which could be destroyed not only from land, but also from sea. But before this mode of approach were adopted as the sole means of entrance, it would be necessary for our military critics to thoroughly weigh the consequences.

What then are the great strategical advantages which, in my humble opinion, make the Tunnel no longer a danger, but a strategic necessity for England? The supremacy of the Fleet remains, but that supremacy is being threatened, at least as far as its overwhelming superiority is concerned.

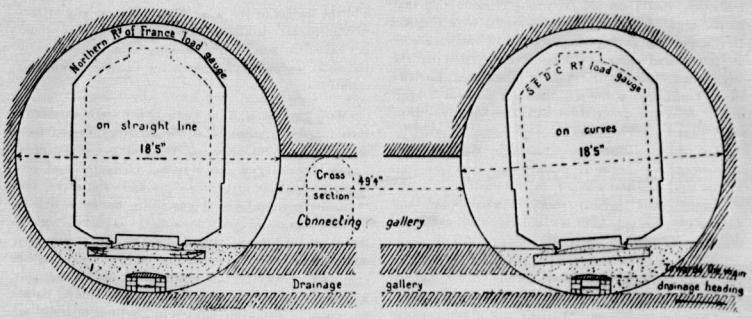
We must at any moment be prepared to concentrate a large portion of our naval forces upon the pursuit and destruction of an enemy, and we may have to leave our shores partially unguarded by our Fleet. What then of our food supplies, sufficient only at any time for four or five weeks' maintenance of our population? Are we to be starved into surrender?

With the Channel Tunnel once constructed, we can dismiss this consideration from our calculations in the case of any enemy except France. Our food supply would be assured and our fleet untrammelled in the fulfilment of its primary duty—the finding and destruction of the enemy. Take, for instance, a Continental war in which we were allied with France. What an advantage we should possess if we could send troops to the Continent unknown and unseen by the enemy. And what a target the troop transport would offer to hostile airships and aeroplanes if the transportation had to be conducted by sea!

These reasons only make me doubt, both for England



Plan of the Tunnels and Approaches.



The Twin Tunnels, showing Connecting Galleries and Drainage Galleries.

and France, the wisdom of connecting the Tunnel by an open viaduct, because if such a structure could be destroyed by our own ships and our own airships, it might, no doubt, be destroyed by the enemy in the same way; and we may be sure that he would spare no pains to wrest from us the advantages which the through communication would give us in the event of war breaking out between England and France, as allies on the one hand, and any other nation or nations on the other.

I have now dealt with the military argument fully and fearlessly, because otherwise I might properly have been taunted with the criticism that I was afraid to face it. Military advantages are not, however, the only benefits which this country would reap by such a connection. We Englishmen are either good sailors, or ashamed to own ourselves bad ones. We do not, therefore, resist the temptations offered to us of travelling abroad for our pleasure, or evade the calls of more serious pursuits. Very different indeed it is when the position is reversed. Other nations have not the same opportunities of becoming familiar with the sea, and foreigners, with some notable exceptions, come to England when they *must*, not otherwise; and yet England is a country second to none in the beauty of its scenery and the historical interests of its monuments, while its markets offer unparalleled opportunities for the exchange of trade. What is the conclusion? In 1911, according to Mr. Sartiaux, Chief Engineer of the French Northern Railways, there were 2,800,000 travellers between France and Germany, with a combined population of 100 millions; 4,350,000 between France, Belgium and Holland, with a joint population of 50,000,000; and only 1,650,000 travellers between England and the whole of the European continent.

I venture to assert, without any fear of contradiction, that I am not far wrong in estimating that 80 per cent. of the 1,650,000 passengers were English. If you put the average expenditure of each traveller at £20 per head whilst he is abroad, you will find that the adverse balance—*i.e.*, the drain of capital from England to the Continent—is no less than £26,000,000 a year, or 10 per cent. of our total available for investment every year.

The figures of trade, as instanced by the movement of merchandise between France and Germany and France and England are not less eloquent:

From 1904 to 1911 the trade between France and Germany increased from 47 millions sterling to 81 millions—an increase of 60 per cent.

Within the same time the trade between France and England rose from 88 millions sterling to 116 millions sterling—an increase of thirty per cent. only.

These figures are more striking still if you come to consider that out of 12,543,000 tons of merchandise exchanged between England and France, 10,151,000 tons consisted of coal, leaving only 2,392,000 tons of general merchandise.

Trade follows the trader, and its volume will only increase as the result of greater facilities of intercourse.

The idea that the Tunnel would to any appreciable degree affect the shipping interests is based upon a total ignorance of facts, and can be dismissed. The Tunnel could only hope to command the transport of expensive or perishable articles capable of standing the cost of the safer and more expensive route. It is a question of a million or two tons of goods to be received from or to be distributed over the whole of the Continent. Our total tonnage of imported and exported goods amounted in 1912 to 189,000,000 tons, and the total weight of goods exchanged with the Continent alone to 85,000,000 tons. The tonnage to be diverted by the Tunnel is, therefore, an insignificant quantity compared with the huge tonnage dealt with by our shipping trade, and would, in my estimation, be much more than compensated by the increased trade which the Tunnel would bring to this country, whilst it must not be forgotten that the South Eastern & Chatham Railway and the Chemin de Fer du Nord, who own both mail and cargo steamers, would be the greatest and yet most willing sufferers.

The fear that the existence of the Channel Tunnel might upset the labour market is not less chimerical. Indeed, the conditions of labour in England as contrasted with the Continent are not such as to attract large volumes. The working men who seek to improve their daily lot—Italians, Spaniards, Germans, Swedes, Russians, Greeks—emigrate in large numbers yearly to the United States, Canada, Brazil, Argentina and other countries, regardless of the inconvenience of the journey and the danger of the seas. Had they seen any attractions in the labour market of Great Britain, they would not have been deterred from seeking employment here by the short sea journey between the Continent and this country.

Many opponents of the Tunnel when confronted with such tangible arguments as these change the subject, and ask if an influx of foreigners would not constitute a danger, by changing our national character and our insularity? How little indeed we know ourselves, and that want of knowledge applies to the nation as well as to the individual! Where, indeed, have you seen a colony of Englishmen abroad, and observed that colony adapt itself to its environment and lose its English character? Whether an Englishman be playing golf at Le Touquet, gambling at Nice or Monte Carlo, governing or disporting himself in Egypt or in India, an Englishman he remains in all his English habits, with

all his sterling qualities and small foibles. Can it, therefore, be seriously argued that a few or many more foreigners visiting our country will modify this typical character of our insularity? The notion is too absurd for words.

I have dealt with the whole problem—if only in a cursory manner—with the exception of one particular point. Let us see whether in the words applied by Lord Palmerston to the Suez Canal, the Channel Tunnel scheme would "spell disaster to all who are mad enough to assist it."

At the normal rate of yearly increase, the number of travellers crossing the Channel by all routes would by the year 1920, when the Tunnel would be finished if the work were begun to-day, reach 2,000,000. I venture to think that the Channel Tunnel would capture at least 65 per cent. of these, or 1,300,000 passengers in all, which, at a fare of 10s. per head, would secure an income of £650,000. The transport of luggage would add 10 per cent, or £65,000, and the postal service a further £40,000. As to goods traffic which would choose the safe and rapid, though expensive, route, we think we are not too sanguine in counting on reaching £800,000. This would give us a total of £1,555,000.

Our working expenses have been carefully calculated as follows:—

Cost of working train service	...	£108,000
Expenses at terminus ...	...	40,000
Repairs and upkeep	...	80,000
General charges and Sundries	...	84,000
Pumping and lighting ...	...	108,000
Total ...	...	£420,000

leaving a net profit of £1,135,000 on the capital, as I have said, of some £16,000,000.

You will see that in this estimate no account has been taken of the increase in passenger traffic which would result from the construction of the Channel Tunnel, and if, as I think likely, we were to transport 2,000,000 or even, as I think we should soon, 3,000,000 passengers in a year, it is easy to see how enormously the profit would be swelled, though the fares would be substantially reduced.

But do not think, ladies and gentlemen, that the promise of so rich a harvest is the incentive by which my comrades in arms and I are spurred to fight for the Channel Tunnel. Believe me when I declare that our aim is much higher than any possible monetary gain. The principal motive which inspires us is to indelibly engrave our names upon a page in the history of the civilisation of the world, and more especially on a page in the history of the two countries, England and France, which have for centuries on their separate paths done so much towards that civilisation, and which will do so much more if their young friendship be strengthened by the link which we wish to forge—the Channel Tunnel.

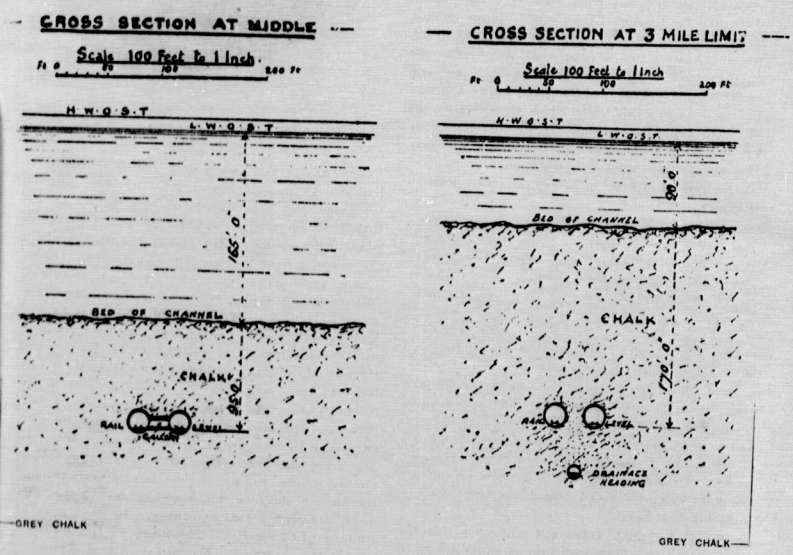
Sir FRANCIS FOX, M.Inst.C.E.
(Sir Douglas Fox & Partners, Engineers to Channel Tunnel Company, Ltd.)

Sir Francis Fox, whose firm (Sir Douglas Fox & Partners, 56 Moorgate Street, E.C.) has been selected to design and superintend the construction of the British section of the Channel Tunnel—if sanction be given to the scheme by His Majesty's Government—is the second son of the late Sir Charles Fox. During a long professional career he has been associated with many important engineering works at home and abroad. He was Joint Engineer of the Great Central Railway Extension to London, and connected similarly with the making of the Charing Cross, Euston and Hampstead Railway, and the Great Northern & City Railway, both in tunnel. He also took part in the building of the railway tunnel under the River Mersey, and was nominated by the British Government as a member of the Commission of three experts on tunnelling in connection with the construction of the longest railway tunnel in the world—the Simplon, through the Alps. Tunnelling has, therefore, been a speciality in his large and varied experience. In May, 1900, he contributed to the Royal Institution of Great Britain a valuable paper on "The Great Alpine Tunnels."

Engineering Details of the Scheme.

Sir Francis Fox, M.Inst.C.E. (Sir Douglas Fox and Partners) gave a summary of a paper which he had prepared on the engineering details of the scheme.

He said: At the outset, I wish to state that neither the Baron, nor I, nor any of our colleagues would entertain this project for a moment if we thought that it was going to injure our position as a nation.



Cross Sections showing depths of Channel.

But on the other hand, if it should prove, as I believe it will prove, something which will add enormously to our national safety and security, then I think everyone will agree that it is a matter to which the most careful consideration should be given by the Government, by the Committee of Imperial Defence and by the nation at large.

The position which England has always maintained is that of an island, but I think that I am not divulging any secret when I tell you that one of our leading military men told me the other day that "all that was now at an end, as we have, in consequence of our vast possessions, thousands of miles of frontier to defend, and now the introduction of aeroplanes, airships and submarines calls for an entire change of idea." It is that change of idea which we are here to discuss to-night. I may tell you that the gentleman to whom I refer was a strong opponent of the project eight or nine years ago, but he says now that all the old objections are swept away, and that the question must go back now to the Committee of Imperial Defence. We believe that it will go, and we await their decision with confidence.

The distinguished military authority to whom I refer added: "Suppose that our fleet were called away, owing to the emergency of war to some other place, and that our ordinary trade routes for the supply of food were interrupted, even for a short time, we should come out on top at last—there is no doubt about that—but there might be a hiatus, a gap of three, four, or six weeks, or whatever it might be, before we regained our position, and during that time the food supplies of this country might go up to famine prices, and the effect might be to bring about a panic which would compel the Government unwillingly to conclude a dishonourable truce, whereas, if the Tunnel were open a continuous supply of food could be forwarded through the Tunnel, and even if the food trains did not come through, the mere knowledge of the existence of such a means of communication would go a very long way to allay any possibility of panic or fear."

The next point as to which I wish to dispel a fallacy is this. Some years ago—I think it was in 1882 or 1883—it was imagined that there would be a military officer sitting in Pall Pall, where the War Office then was, with an ivory button in front of him, and he might hesitate as to whether he should push the button and blow the Tunnel to "smithereens," and perhaps he might delay a little too long. All this is most absurd. There is no idea of destroying the Tunnel, and thus wrecking £16,000,000 worth of property. If you look at the sections of the Tunnel which appear on the maps on the wall, you will notice that there is a dip shown in the line of the Tunnel. That dip would be under the control of the commanding officer at Dover. All he would have to do would be to open a valve, and admit a certain quantity of water, which would fill the Tunnel for a few hundred yards up to its roof, so that no living thing, not even a rat, could get through. Therefore, there is no question of destroying the Tunnel except in case of absolute emergency.

That brings up the suggestion that when the railway comes out of the Tunnel it should run along a viaduct in the sea which our Fleet could destroy at a moment's notice. We think that that would be a mistake, because, if our Fleet could destroy the viaduct, everybody else's fleet could destroy it also. We do not want this to be done. Therefore, what we rely upon is that the mouth of the Tunnel shall be under the direct fire both of Dover Castle and the Western Heights, and that the commanding officer there shall have the means of putting a certain quantity of water into the Tunnel, and so completely blocking it. This water could not be got out until peace had been concluded, when the water could be removed by pumping, the necessary machinery being under the control of our own military officers; and when the water was removed, it would be found that the Tunnel had not been injured. I have thought it right to make this explanation to dispel a fallacy which has existed in the minds of many of the public.

In his paper Sir Francis Fox said:

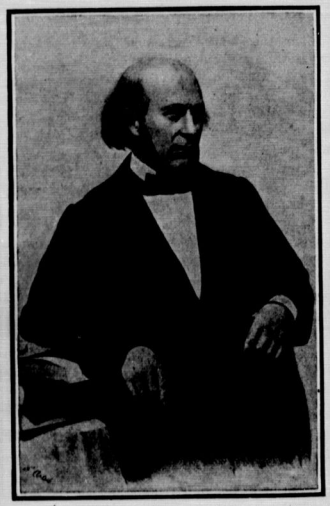
The proposal for a Channel Tunnel is over 100 years old, and from time to time it has been considered, then rejected, and again resuscitated, in consequence of increased knowledge of the problem; but the eventual construction of such a line of communication with the Continent is sooner or later inevitable.

Earlier Schemes.

The numerous proposals which have, during many years, been put forward for bridges over the Channel, for train ferries on the Channel, and for tunnels under the Channel between Dover and Calais, show the importance which attaches in public opinion to the question of improving the means of communication between Great Britain and the Continent of Europe.

Of the first, the most noteworthy are: Thomé de Gamond's suggestion of 1857, to bridge the Straits between East Ness Corner and Calais; A. Motiers' proposed bridge between the South Foreland and Cap Grisnez in 1875; a bridge designed by Messrs. Schneider et Cie., M. Hersent and Sir Benjamin Baker, to pass over the Varne and Colbart Banks, estimated cost £34,000,000; and a similar scheme by Renard in 1890 for a shorter bridge between Cap Blanc-Nez and the South Foreland, estimated cost £28,320,000. It is here interesting to note that M. Renard in a survey of the Channel bed found that it was composed of regular,

homogeneous beds of chalk. Speaking generally, bridge schemes have failed through their great initial cost, the expense of maintenance, opposition from navigators, difficulties of deep foundations, and liability of the works to be destroyed by storms.



M. THOMÉ DE GAMOND, the eminent French engineer, who first put the Channel Tunnel Scheme into tangible form, by the completion of his detailed plans, in 1856.
(Reproduced from *The Sphere*, January 12th, 1907.)

Proposed Ferry.

Of the second, Thomé de Gamond's proposal for a ferry was made in 1837. Between 1862 and 1870 Sir John Fowler brought forward several schemes for train ferries on lines suggested by Mr. Evan Leigh; and clients of Sir Douglas Fox and Partners, in conjunction with a French company, applied for similar powers in 1905. These schemes failed through opposition from the Admiralty and from the harbour authorities. An Act was passed several years ago, giving general powers to the last named combination for such a ferry, but without defining its exact position. These projects, though economical from a capital point of view, would not relieve traffic from the uncertainties of the sea and weather, nor from the dangers of navigation, and would still involve delays.

Tunnel Projects.

Of the third or tunnel projects the following among many others may be mentioned: In 1802, a French mining engineer, M. Mathieu, presented to Bonaparte a scheme for a submarine tunnel, which was personally supported by the British statesman Charles James Fox; and Thomé de Gamond's proposal in 1859, for a tunnel through the chalk from Eastware Bay to Cap Grisnez—approved by Brunel, Locke, and Robert Stephenson. The same project was revived in 1867, and the Channel Tunnel Company, formed under the auspices of the late Lord Stalbridge (then Lord Richard Grosvernor), Sir Edward Watkin, and the South Eastern Railway Company, brought forward a similar one in 1883. The Bill deposited by that Company was rejected, largely on military grounds, by a Joint Select Committee in July, 1883. Tunnels have also been suggested by J. F. Smith in 1861, and by Zerah Colburn, Thomas Payne, P. T. Bishop, and others.

Steam Ferry.

On the last occasion, in 1907, several objections were raised to the proposal for a Tunnel, preference being given to that for a Steam Ferry; but since that date much additional information has been obtained which fully justifies the re-consideration of the whole subject.

As regards the proposed Ferry, it has been proved, as those who are acquainted with the scheme well knew, that the difficulty of the rise and fall of the tide would necessitate the construction of costly harbours on both sides of the Straits, and that the transfer of the trains from the land to the steamer and from the steamer to the land would give rise to so much difficulty and delay that anything like regularity of service could not be secured.

The existing train ferries between Germany, Denmark, and Scandinavia are great accomplishments, but by no means a perfect success. In a rolling sea a railway carriage is not a desirable place in which to be confined, and sea-sick passengers are not on a ferry so well provided for as on an ordinary passenger steamer. The after results to the various compartments and the stuffiness of the carriages are very undesirable.

A ferry could hardly cope with the three or four separate trains which now meet the steamer—for Paris, Brussels, Bale and the Simplon express—and the delay in dealing with these could not be otherwise than very prolonged. The suggestion of a ferry is, therefore, absolutely impracticable.

Cross-Channel Service.

Great improvements have, of late years, been introduced into the cross-Channel service, but serious delay and much discomfort and inconvenience still arise from the necessity for double transhipment as also from the passage itself. We have met with a very general opinion that through and uninterrupted communication would be of great advantage and convenience, not only for passengers and light and perishable goods, but also for heavy traffic. The existence of through communication between Dover and Calais would undoubtedly tend to increase the Transatlantic trade from British ports.

The Proposed Tunnel.

The preliminary operations of the two Companies at Dover and Sangatte in connection with the proposed Tunnel have been of importance, to a great extent, as a practical test of what may be anticipated in carrying out the proposed works.

(*a*) Dover.—A gallery 7 feet in diameter and of true circular form was driven in 1882-3 from the west side of Shakespeare's Cliff by Colonel Beaumont's boring machine. It was completed on a descending gradient of 1 in 80 for a total distance of 2,300 yards when the works were stopped, the present face being under the sea, near the former end of the Admiralty Pier. The gallery is throughout in the grey chalk, and it proved to be almost dry. The volume of water entering the entire length of the heading is said to have amounted only to 1½ gallons per minute, which gradually diminished. Considering that no iron or brick lining was employed. this amount of water is a negligible quantity.

The engine-wright, who had charge at that date of the machinery, informed us that a piston pump 4 inches in diameter only was required to work half a day in a fortnight, in order to keep the gallery dry. This is without any lining at all, but the Tunnel would be lined throughout, and the only place where infiltration could take place is the opening where the shield making the excavation was being driven.

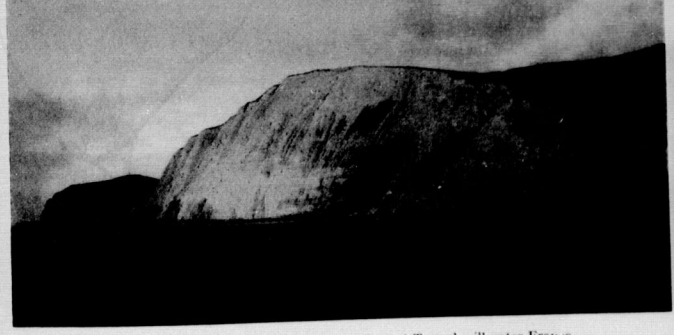
French Boring.

(*b*) Sangatte.—According to the Report of the Committee presented to the French General Assembly, May 9th, 1883, a total length of 1,839 metres (2,009 yards) of similar gallery was driven up to the date when the works were stopped on 18th March, 1883. This gallery was chiefly carried out by means of Colonel Beaumont's boring machine, and, in consequence of the men becoming accustomed to the work, as much as 115 yards were executed in six days. The present "face" of this gallery is under the Channel, 800 metres from the beach, measured at right angles to the coast.

The depth of the sea at this point is 27 feet below low water, and the thickness of "cover" is about 100 feet. We understand that the quantity of water entering the gallery was about 400 gallons per minute. This experimental gallery was unlined. We are informed that, although the water in the shaft rises and falls with the tide, the volume is very small and the infiltration slow, as indicated by the fact that, with a rise and fall of tide of 18 feet, the water in the shaft rises and falls to the extent of a few inches only.

Geological Investigation.

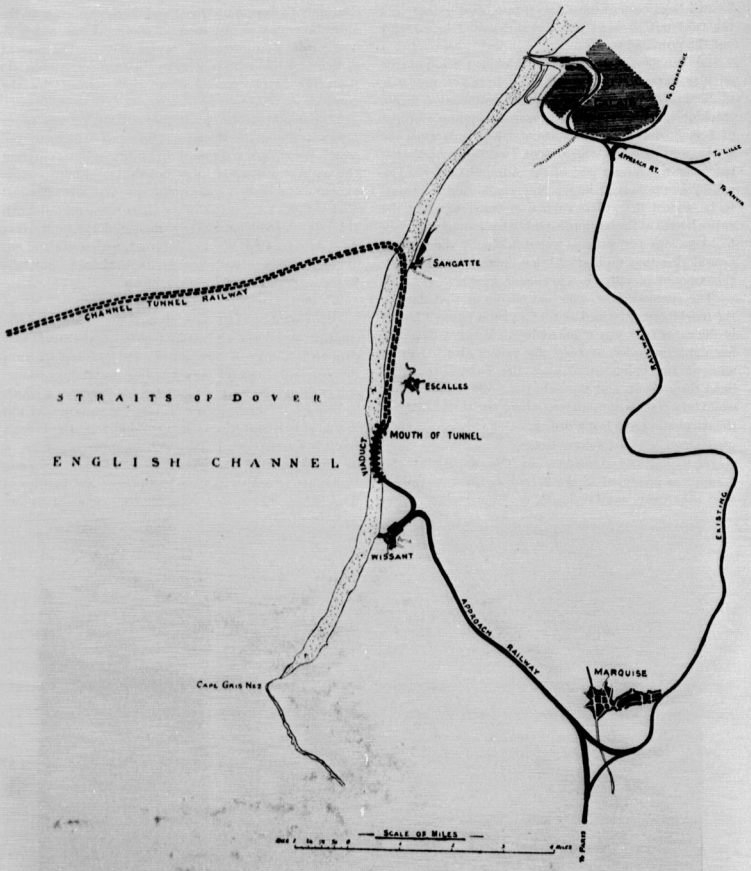
My Partners and I have studied the opinions of the eminent geologists who have dealt with the strata met with on both sides of the Channel. The strata which form the coast of England between Dover and Folkestone, and of France between Sangatte and Wissant, and which lie beneath the English Channel between those points, dip in a northerly direction. In 1876 and 1877 the French geologists, Messrs. Potier and Lapparent, with a machine designed and employed by the late Sir John Hawkshaw, took some 7,600 samples of the bottom of the Channel, 3,267 of which they were able to utilise.



The chalk cliffs at Sangatte, where the Channel Tunnel will enter France.

(Reproduced from *The Sphere*, January 1st, 1907.)

THE CHANNEL TUNNEL.



Approach to Tunnel on French side.

NOTE.—The Viaduct shown would not be made, unless desired by the British Government.

It was found from these that the lines of outcrop of the strata are very nearly parallel to a line drawn from Folkestone to Sangatte. By noting the composition of these samples, and the position from which they were taken, it is possible to follow the outcrop of the strata which appear in Shakespeare's Cliff and in the shafts sunk close to it the whole way across the Channel to the coast between Sangatte and Escalles. The geological system to which these strata belong is the Cretaceous, which is divided into two divisions, upper and lower. It is only necessary to deal with the upper (Fr. *Série Supra-Crétacée*). This is divided into four sub-divisions, the lowest being the (*a*) Gault and Upper Greensand (Fr. *Albian*), followed by the (*b*) Lower Chalk (Fr. *Cenomanian*), (*c*) the Middle Chalk (Fr. *Turonian*), and (*d*) the Upper Chalk (Fr. *Senonian*). These successive strata are very clearly seen in the cliffs on the French coast, between Escalles and Sangatte. They incline gently from the top of the cliffs to the beach in a north-easterly direction.

The following are the chief characteristics of these beds (the thicknesses given having been measured at the Channel Tunnel experimental shaft, Sangatte, and at the shafts sunk near Shakespeare's Cliff, Dover):—

(*a*) The Gault and Upper Greensand are equivalents of one another, formed contemporaneously, under different conditions of sedimentation. The Gault is a dark, stiff, blue, and sometimes sandy, clay; the Upper Greensand, an inconsistent group of greenish sands and sandstones.

(*b*) Above the Gault and Upper Greensand comes the Lower Chalk, at the base of which is a well-defined band of Glauconitic or Chloritic Marl (Fr. *Craie Glauconieuse*), 11 ft. thick near Dover, 10 ft. 6 ins. thick at Sangatte, a greenish chalk containing grains of Glauconite and Phosphatic Nodules.

Above this lies a layer of Chalk Marl (Fr. *Craie Marneuse*), 23 ft. thick at Dover, 29 ft. at Sangatte, a clayey chalk, impervious to water.

The Grey Chalk.

Above the latter comes the great body of the Lower Grey Chalk, called by the French *Craie Grise* and *Craie de Rouen*, at Dover 87 ft. thick, at Sangatte 80 ft. It is a compact, impervious stratum of greyish coloured chalk, containing no flints, and, as far as can be ascertained, free from fissures and slides. It is in this bed of chalk that it is proposed to construct the Tunnel, as being a most excellent material in which to work, and one possessing the peculiar property of gradually "puddling" itself and becoming impervious. This bed consists of white chalk, permeated with mud or clay, these two ingredients being very similar to the component parts of Portland Cement.

(*c*) Above comes the Middle Chalk, white in colour, containing a few flints, and at its base a band of hard nodular chalk (Melbourn Rock).

An Impervious Material.

The division between the Middle and Lower Chalk is well marked on the cliffs west of Sangatte by small springs of water and lines of vegetation growing on the face of the rock. The water which has found its way through the Upper and Middle Chalk is unable to pass through the impervious Lower or Grey Chalk, and trickles out on the face of the Cliff at the junction of the two strata.

(*d*) The Upper Chalk is a mass of white pulverant chalk, containing scattered flints. It forms the upper portion of the Shakespeare's Cliff near Dover. The Upper and Middle Chalk contain a considerable amount of water, which percolates through the lines of flints.

Agreement with French Engineers.

As a result of interviews of my firm and frequent communications, we find ourselves in complete accord with the French Engineers upon the following essential questions:—

(*a*) That the proposed Tunnels can be constructed throughout in the Lower or Grey Chalk, a stratum very homogeneous, practically free from and remarkably impervious to water.

(*b*) That the occurrence in the Grey Chalk under the Channel of water-bearing fissures is improbable, but not impossible.

(*c*) That the presence of any such fissure can be foretold with certainty, and without risk to the men employed, by providing a pilot drill to be attached to the boring machine, an advanced trial hole being thus always kept in front of the excavation.

Precaution against Fissures.

(*d*) That, should such a fissure be encountered, due precautions can be taken according to well-tried engineering methods, which, in the opinion of the French Engineers and ourselves, would ensure the work being carried past the fault, any water arising from such fault being duly excluded.

Within the last four or five years high pressure grouting has been introduced, for the purpose of filling up interstices, and stopping the flow of water in sandstone, chalk and other geological beds. In sinking colliery shafts in South Yorkshire through heavily watered deposits, a pressure of 400 lbs. to the inch has been employed, whilst under the Hudson River in New York tunnels have been driven in heavily fissured rocks under 100 feet of water in the river, which work, without the aid of this invaluable method, would have been impossible. The pressure in this case was as high as 500 lbs. to the inch.

In the Mersey Tunnel and elsewhere we have encountered fissures with which we have thus dealt successfully. Of this important work a longitudinal section is shown to this Congress.

(*e*) That a Drainage Heading should be driven from each side of the Channel, rising towards the centre, and connected at Dover and Sangatte with shafts for pumping and winding.

Main Tunnels.

(*f*) That the Main Tunnels should consist of two single track circular tunnels, each of 18 feet net internal diameter, and thus large enough to accommodate the Rolling Stock of the British and French main lines, except only their locomotives, for which would be substituted electrical locomotives of ample power to deal with the heaviest trains running upon the Main Lines.

(*g*) That there are several great advantages to be derived from this plan, as compared with the construction of a double "two-track" tunnel, namely: the vertical dimensions are thereby much reduced, rendering it easier to adjust the position of the tunnels in the Grey Chalk; the ventilation of the works, both during construction and after completion, is rendered simpler, and more efficient; the cost of any lining is much reduced; and the work can be more readily carried out by the well-tested system of shield, combined with mechanical excavators.

Cross Passages.

(*h*) That the Tunnels should at frequent intervals be connected by cross passages, with air-tight doors, thus rendering it easy to introduce currents of air, and to exchange workmen from one tunnel to the other.

(*i*) That the Tunnels should be well lighted and thoroughly ventilated, and the traffic worked by electricity.

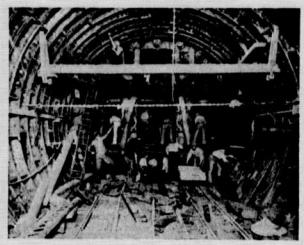
The total length of Tunnel, including the necessary junctions with the main lines of railway in England and France, would be 31 miles.

Diameter and Gradient.

Dealing now with the Specification for the Works which would devolve upon the British Company to execute—we propose to provide for two single track Tunnels as mentioned, 12 miles in length from high-water mark to the middle of the Channel, each of 18 feet net internal diameter—one for the "Up," the other for the "Down" traffic—to be driven chiefly on a descending gradient, but with a slight rise near the centre of the Channel. These tunnels would be placed 36 feet apart, measured from centre to centre, but connected at frequent intervals by cross galleries, in this respect being very similar to the Simplon Tunnel through the Alps, of which some sections are also shown in this hall.

Mode of Construction.

The Tunnels to be driven by shields (the débris being carried by electrically-driven belts to the wagons, which will be removed in trains hauled by electric locomotives), and to be lined throughout with cast-iron segments, of ample strength to resist any possible pressure, and grouted on the outside, in the usual manner, by means of the "Greathead" grouting machine. By this method the exterior of the Tunnel is completely surrounded by a covering of cement, which not only prevents leakage into the tunnel, but also preserves the plates from corrosion



The Greathead Shield at work in a Tunnel.

When the plates are in position, the inner face would be lined with concrete in cement and lime-washed, thus providing a smooth interior surface, so that in case of the derailment of a train, little damage would occur, owing to there being no projection or obstruction which could foul the vehicles. This lining would preserve the plates from corrosion on the inside, and would also materially assist the ventilation.

The length of Tunnel under the land on either side of the Channel would be of ordinary construction for a double line, and be lined with brickwork.

In certain places, where the necessities of the work of construction or of the traffic demanded, an enlarged cross section of Tunnel would be provided, where the hauling machinery for removing the débris could be placed, and pumps and ejectors for freeing the Tunnel from water fixed. These would also serve as block stations for the signalling equipment, when traffic was running

Primary Ventilation.

At frequent intervals along the entire distance, cross passages would be constructed, fitted with air-tight doors of suitable design. These galleries should be placed obliquely, in order to facilitate the passage of trains of material both from and to the advanced faces, and for the primary ventilation. Thus the construction trains, as also the main air current, could enter by one of the main tunnels, and crossing over by the most advanced oblique passage, return by the other tunnel. The secondary ventilation would commence at the last oblique passage. Upon the completion of the work, these galleries would, as before mentioned, serve as means of communication between the tunnels for the workmen on the Railway.

Section of a Single Line Tunnel.

Drainage Heading.

Having thus described the general arrangement and design of the permanent Tunnels, it is necessary to consider the important question of the Drainage Heading, which would be the first work to be proceeded with.

Mersey Tunnel.

In order that the Drainage Heading may be constructed independently of the works of the Main Tunnels, and to facilitate the conveyance of spoil and the clearance of any water that might be met with, it is proposed to adopt the system which we employed in the case of the Mersey Tunnel—and which is also to be adopted by the French Engineers—of introducing a falling gradient of, say, 1 in 500 from the lowest point of the Tunnel on the British side to the pumping shaft near Dover. This Heading would be driven by a shield, and connected with the Tunnels at such points as may be found desirable, thus rendering it of great service not only for drainage purposes and for the removal of the excavated material, but also as supplementary to the main system of ventilation.

This Heading will probably have to be lined with cast iron plates, having their faces machined and securely bolted together. These plates would be of sufficient strength to resist the full pressure, and, when grouted up, would be watertight. The only possible water-yielding area would thus be the actual face exposed and one length of chalk to be covered by the next ring of cast-iron. While we were working at the Mersey Tunnel we did some blasting under the middle of the river one night when the whole Channel fleet was in the river above us, and not the slightest damage ensued.

I was connected with the Simplon Tunnel, where we cut into tremendous springs, and we found that a gradient of 1 in 500 was enough to enable the water to flow away. We also found hot springs—a difficulty that we should not have in the Channel. The engineering work in the Channel would, by comparison, be a perfectly simple operation.

Approved Machinery.

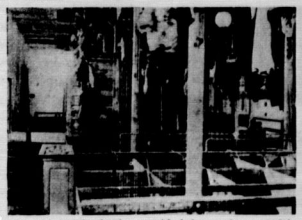
The Drainage Heading would be excavated by means of some approved cutter, or of Price's electrical digger, used in the tube railways of London. These machines work on a central shaft—an important feature, as will be seen later.

An advance of 5 feet per hour can be secured both in excavation and also in the fixing of the iron lining; but, allowing for inevitable delays, and for the long distances from the shaft, we are of opinion that, with properly designed machinery and arrangements, a speed of 2½ feet per hour can be relied upon for six days in the week, it being desirable and necessary not to drive on the seventh, the men requiring rest and the machinery slight repairs.

Rate of Progress.

Assuming 17 yards per day can be maintained for six days per week, this would represent an annual progress of about 3 miles at each face, occupying a period of four years to drive the Drainage Heading from the English to the French shaft (24 miles). Three shifts of men would have to be employed, and the changing should take place below and on the spot, no stoppage of work being allowed. This was the system followed in the case of the Simplon Tunnel, where the drills never stopped even whilst the shifts were changing.

An emergency door would always be kept in position near the "face" of the Heading, not so much for actual use, but rather to induce confidence in the minds of the men at work.



Hot and cold douche baths provided for workmen, with 1,500 ropes to raise and dry their clothes, each man padlocking his belongings. This system was adopted in making the Simplon Tunnel, and it would be followed in the construction of the Channel Tunnel.

Enlarging Present Heading.

The diameter of the Drainage Heading is a matter of importance. Up to the present time the preliminary work has been carried out with a diameter of 7 feet. But, as this heading will have to serve for the line of communication for all labour and material required for the execution of the Tunnels, it is essential that it should be of sufficient size to allow of two sets of wagons passing one another, and, at the same time, to leave sufficient space for air, water, power pipes and cables. In our opinion it should not be less than 11 feet net internal diameter. There will be several break-ups into the

Main Tunnels. Each will yield a large amount of excavation, and will also require a considerable tonnage of cast-iron plates to be delivered with strict regularity. Consequently, a complete line of way in each direction is, in our opinion, important.

Scheme Recommended.

As soon as it is decided to proceed with the work, we would recommend that the following course be adopted :—

The Drainage Heading would be commenced and driven ahead, at as high a speed as found to be practicable, it being a matter for the Directors to decide, whether this should be completed before proceeding with the Main Tunnels, or whether they should be carried forward at the same time.

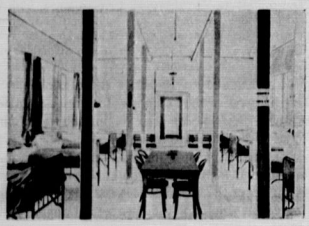
The break-ups, or commencement of enlarged sections of the Main Tunnels, already referred to would be made where the chalk had been found most suitable, and at each break-up a full-sized shield would be erected, to permit of the excavation to the full external diameter of, say, 20 feet.

These large shields would be fitted with hydraulic or electric erectors, which we have previously employed, and which act like a human arm—take hold of the plates, lift them up, and hold them in position until bolted in place.

Rotherhithe Tunnel.

This system of construction has been adopted in one of the latest instances of sub-aqueous work, namely, the Rotherhithe Tunnel built for the London County Council, and has proved highly successful, a pilot heading 11 feet 6 inches in diameter having been driven in advance, the larger tunnel, 30 feet 8 inches in diameter following.

Each ring as it is put in position would be bolted up and grouted, so that, as already described, the only portion of the chalk laid bare at one time would be the actual working face and a length of boring equal to one ring of plates.



Hospital, fully equipped, for workmen employed in the construction of the Simplon Tunnel, but rarely used, owing to the care taken by engineers and contractors alike.

Miner's Wedging Crib.

Should broken ground or a fissure be encountered, arrangements would be made for fixing a miner's wedging crib in the nearest sound bed of chalk. This crib would consist of a ring of cast iron in sections, tightly wedged up with dry pitch pine wedges and grouted, so as to prevent water travelling behind the plating. The chalk would then be grouted up in front, under pressure. As soon as the broken ground had been passed and good solid chalk again reached, a second wedging crib would, if necessary, be fixed. Thus any water coming through the disturbed strata would be imprisoned between the two cribs, and prevented from travelling along outside the tunnel. Where we find fissures in rock which allow water to flow in, we can, by machinery invented by the late Mr. Greathead, blow cement into the fissure at high pressure. I have here on the table pieces of rock which had fissures. The fissures have by grouting been filled in so well that the grouting is now the most solid part of the rock. So that with modern machinery we are not afraid of fissures. We can detect them at once, deal with them, and stop the flow of water.

Supply of Air.

It will be necessary to keep an efficient supply of air throughout the entire length of the heading for the men employed. This can best be effected by bratticing off the upper portion of the heading, thus forming a conduit of the required size for the volume of air, which would be blown in by high-speed fans.

When the break-ups are begun, this conduit will also have to provide air for the men working at these enlarged faces, until the second tunnel and crossways are in progress. The ventilation can then be effected in a manner similar to that adopted in the Simplon. In that case there are two parallel galleries with connecting traverses. Fans blow the air in at the end of one tunnel, and, after travelling up to the most recently excavated traverse, it returns by the other tunnel. This is known as the primary ventilation, and the volume of air is sufficient to keep all the galleries and traverses in a perfectly fresh condition.

To ventilate the advanced end at the face, secondary ventilation would be adopted, so as effectually to prevent the stagnation of air so common in advanced galleries of tunnels and mines, and to enable the men to work with vigour and in comfort.

The question of the permanent ventilation has received our very careful consideration, and it may be desirable to state briefly how it would be dealt with when the Railway is open for traffic. In the case of long tunnels worked by steam locomotives, the most efficient system has been found to be blowing the air against the traffic, by which means the Driver and Fireman, upon whom the safety of the train depends, are kept in fresh air, free from smoke and steam.

But, in the case of electrically worked tunnels, where no products of coal combustion exist, the reverse is the better plan. The air will thus be blown in the same direction as that in which the train will be travelling, so that they will assist and not retard the current

train, where ample space will be available as a footpath, clear of the electrical conductors. The passengers would thus be free from smoke, in consequence of the direction of the current of air always blowing from the rear of the train towards the front. In consequence of

Entrance to old Channel Tunnel, at Shakespeare Cliff, Dover.
(Reproduced from the *Illustrated London News*, November 10, 1906.)

Electrical Working.

The traffic being electrifically operated, the volume of air required is very largely reduced. We have assumed, as a maximum, a passenger train each way every ten minutes, carrying 500 people. The volume of air per minute required to keep the tunnels pure and fresh will be about 45,000 cubic feet on each line of way, travelling at a velocity of 6 feet per second, which is equivalent to a very light breeze. There will be no difficulty in dealing with this—it being far less in proportion than we have had to provide elsewhere.

The power required to induce this current of air, much assisted as it will be by the trains, will not be large, and the entire problem is simple as compared with that in many large collieries, through which not only are far greater volumes of air blown in order to deal with great "blowers" of explosive gas, but the length of passages through which the air has to be driven or exhausted is considerably greater and impeded by bends, which will not exist in this case.

Prevention of Fire.

The prevention of fire in the trains is also one to which much attention has been devoted. In the case of specially-built rolling stock for the London and Paris and other Expresses, no inflammable material should be used, and as the motors of the Electric Locomotive will be "armoured" against fire in case of short-circuiting, no danger would arise as regards the electrical working even from the employment of ordinary rolling stock. Assuming, however, that, in spite of precautions, any stoppage should occur in the tunnels, the passengers would readily pass along the tunnels in the rear of the

the large diameter of the tunnels, the electric conductors can be so placed as not to obstruct the permanent way or interfere with repairs.

Electric Lighting.

The tunnels would be lighted throughout by electricity. A separate and special circuit will be provided, so that in the event of the main traction current failing, the lights in the tunnels will not be extinguished. Carriage lighting would be independent, each vehicle having its own store of light.

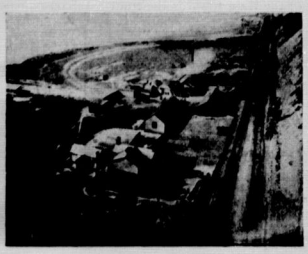
Sanitary and hygienic regulations similar to those so successfully adopted in the Simplon Tunnel will be enforced during the progress of the works.

The French Engineers have satisfied themselves as to the best position for the Sorting Sidings and Station at Sangatte, and as to the site for the deposit of their moiety of the excavation from the shafts, heading, and tunnels. We concur in their views.

International Station at Dover.

The plans and sections for the proposed approach railways on the British side provide Sorting Sidings and a Station near Maxton, just within the Borough of Dover. These Railways are well laid out to accommodate the traffic, and, in conjunction with the Station where the exchange of Steam for Electric Locomotives and all necessary sorting of traffic will take place, provide full and complete means of communication with both the existing main lines between Dover, London, and the rest of England. The Station will be easily approached from Dover by the Electric Tramway which passes very near the site. In the immediate vicinity there is a deep valley, affording a site for the

deposit of spoil. Good sites are also available for the Generating Stations, and one of the first operations would be to instal a portion of the plant for construction purposes.



The old Channel Tunnel Works at Dover.

Success of the Enterprise.

Summing up the engineering questions relating to the proposed Tunnel, we agree with M. Sartiaux and Mr. Brady in the opinion that the enterprise is one which can be carried out with certainty, and at comparatively moderate cost, the geological and other conditions being of an exceptionally favourable character for the construction of a submarine tunnel.

We have not felt it to be within our province to express any opinion upon the question of the best precautions to be taken to secure the Tunnel against its being made use of for aggressive purposes in case of war.

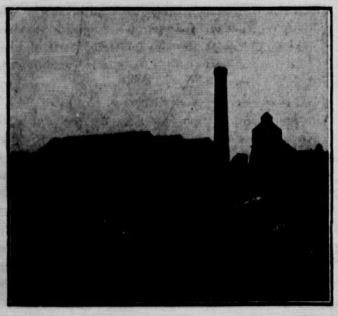
Protective Works.

Foreign Governments, and notably the French, Swiss and Italian military authorities, have introduced in connection with the great Alpine tunnels, protective works which could be readily reproduced in this case, the levels of the proposed Tunnel favouring arrangements which would give each nation complete and independent control of the portion lying on its side of the centre of the Channel. On the French side, it has been proposed to approach the Tunnel over a viaduct, which would be exposed to fire from the sea, and could thus if required be destroyed. The mouth of the Tunnel on the English side, and the Station near Maxton, lie fully exposed—as was recommended by the Parliamentary Committee—to both direct and plunging fire from the existing Citadel and Heights of Dover, while heights to the north of the site could be readily fortified.

Cost of the Scheme.

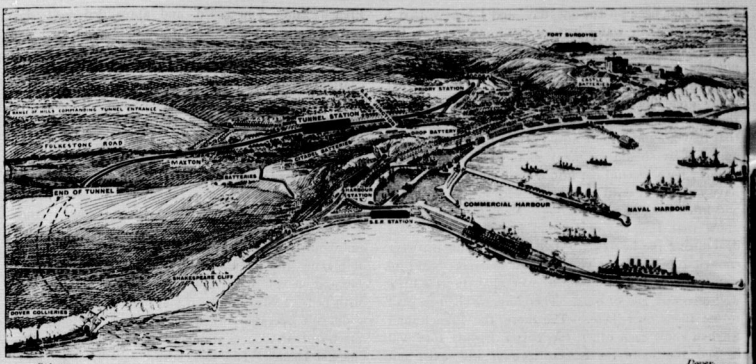
The estimated cost of the British half of the undertaking, including the purchase of Land and Buildings and the existing Works at Dover, the Electrical Installation, the Drainage Heading and its Shafts, Winding and Pumping Machinery, the Land approaches, the Sorting Station and the Sidings, Signals, and the Junctions with the South Eastern and Chatham Main Lines, with Administration, Parliamentary expenses, Legal and Engineering charges, Interest during construction and Financial expenses, with the necessary provision for Contingencies, is £8,000,000 (Eight Millions Sterling).

The great nations of Europe have not hesitated to construct bridges across the rivers between their respective countries, and have even allowed Alpine and other tunnels to be built under ranges of mountains which were looked upon as natural frontier fortifications. Suitable protective works have been provided for securing the various countries against invasion by these means, and they give rise to no anxiety to their Military Advisers.



Spicer. *Dover.*
The Channel Tunnel Works at Sangatte.
Reproduced from *The Illustrated London News*, December 29, 1906.

Spicer. *Dover.*
The Engine Room, Channel Tunnel Works, Sangatte.
Reproduced from *The Illustrated London News*, December 29, 1906.



Spicer. *Dover.*

Sketch plan, showing how the proposed entrance to the Channel Tunnel is commanded by the Heaviest Batteries at Dover.

At the conclusion of the aforegoing address, numerous lantern slides showing plans and sections of the proposed Tunnel and views of works in connection with other tunnels were explained by Sir FRANCIS FOX. He said it has been calculated that it would take a fortnight's constant traffic to get an Army Corps, with its impedimenta, through the Tunnel, and it would require a stationmaster—a *chef de gare*—and a whole battalion of railway officials in order to work the traffic properly. In addition miles of sidings would be necessary, as there would be only one mile of sidings at Dover, which would be wholly insufficient to deal with an army corps; and, of course, apart from this, it would be impossible to carry on any traffic with the forts dropping shells upon them. But, as he had mentioned, traffic through the Tunnel could be stopped at once by flooding. If the Tunnel were constructed, the men would work only six days in the week. Experience had shown that the work was done more quickly and, therefore, more cheaply when men and machinery got one day's rest in seven. In making the St. Gothard Tunnel, owing to the absence of proper provision for the men, 800 died. In constructing the Simplon Tunnel they took proper precautions, and the result was that only 50 men died in six and a-half years. All precautions for the health and safety of the men would be taken in constructing the Channel Tunnel, and the work would be done under the best possible conditions. Mr. J. M. Finez, the Dover representative of the Northern of France Railway, then exhibited and described other lantern slides bearing upon the subject.

M. CONDURIER DE CHASSAIGNE: I have much pleasure in proposing a vote of thanks to Baron d'Erlanger and Sir Francis Fox for the interesting addresses which they have delivered. This is a very difficult subject. Up to now I have known nothing about it, but have merely looked at the headings in the papers, and said "I know nothing about it." But now I cannot say that any longer, as I have listened for nearly two hours with delight to the very clear exposé of Baron d'Erlanger, who knows so well how to make figures interesting, and also to the able technical explanation which has been given by one of the greatest engineers of our time, Sir Francis Fox.

Mr. BARTON KENT: It gives me much pleasure to second the motion. The subject is one which is deeply interesting to all of us, but it is evident that Baron d'Erlanger knows it absolutely by heart. All the objections that were raised to this project in days gone by have been entirely removed by the changes in the circumstances which have been mentioned. We are no longer practically an island. People fly across the Channel. The strategical objections no longer count as they did in past years, and I feel sure that when the Committee of Imperial Defence has considered the matter, these objections will fall to the ground, and I firmly believe that this long projected and much desired Tunnel will come about. Baron d'Erlanger has told you how it can be done and what good it will do. Sir Francis Fox tells you that it can be done easily. When a man in his position says that, you may take his word for it. There is no difficulty about it, nor do I believe that there would be the slightest difficulty in raising the money. I am one of those Englishmen who prefer to go by water. I love the water. Many times I have crossed the Channel to

France and back on the one day, and I believe that I should still go by water just for the fun of crossing the water, even if the Tunnel were made. But others do not like the water so much, and prefer the certainty of travel by land. We were told this afternoon that many Frenchmen do not come to this country because they are afraid of our difficult language; but I believe that they are much more afraid of the difficult Channel, and that we should see many more Frenchmen in this country if they could get into a train in Paris, and not have to leave it until they arrive here in this beautiful and interesting city of London. Many of them do not know that this city of London has changed a great deal during the last twenty-five years. I am Britisher enough to believe that you will not find more beautiful country scenery all the world over than in this little well-groomed isle of ours. Therefore, we shall be glad to see them over here. The more the French and English know each other, the better friends they will be and the more the *entente cordiale* will exist and preserve the peace of the world.

Having been carried by acclamation, the motion was briefly acknowledged by Baron Emile d'Erlanger.

Wednesday, September 24th, 1913.

The Congress met at 10 a.m. in Marble Arch House, Hyde Park, W. Mr. H. H. Spiller presided.

A letter, regretting inability to attend was read from M. Albert Sartiaux, General Manager, Northern Railway of France. It stated, "I see with pleasure that one of the conferences will be devoted to an examination of the project for the construction of a Tunnel under the Channel, which appears once more to be engaging the attention of the English public. It is scarcely necessary for me to point out how the realisation of that project would help in developing commercial and social relations between our two countries."

A letter from Lord Rotherham, which was also read, regretted inability to attend the Congress, and stated: "I do most sincerely hope that your influential Congress will give its most enthusiastic support to the Channel Tunnel project, which is being revived again under auspices far more hopeful than ever before. During the last ten years circumstances have so changed that many former opponents have become warm supporters of the movement; and, indeed, the opinion is now widely held that our National safety demands that the Tunnel be constructed with the least possible delay, and I confess that I have a great deal of sympathy with that contention."

M. Palmié, correspondent *Le Journal*, speaking in French, said: You heard and applauded yesterday two speeches, one eloquent and convincing, the other marked with a fulness of knowledge which is an honour to the country of the learned speaker. Both gentlemen have spoken with equal power of the reasons in favour of the Tunnel under the Channel. They have passed in review all the arguments, refuted all the objections, and shown all the advantages—military, political, commercial and financial—which the Tunnel would possess. I also had read with much attention, if not with much competence, the interesting work of our eminent president, M. Sartiaux. I was hoping to turn it to great account, but what remains of it now? I am about to seem to commence symbolically the work of making the Channel Tunnel by performing before you and on you a piece of "boring." But do not be disturbed. I shall not keep you long in agony. It is a difficult operation when one wishes to limit to a quarter of an hour a statement on the subject of the Channel Tunnel. The task seems easy at first sight, but when one comes to deal with the matter at close quarters, the arguments in favour of the great enterprise, and the answers to the objections of opponents, to which no reply can be made by them, keep piling up, and one has to give up the idea of compressing everything into the small compass of a newspaper article.

I shall confine myself, therefore, to saying some words as to the utility of the Tunnel as far as it concerns the development of the *entente* between John Bull and Jacques Bonhomme. Often the objection is made, it seems seriously, in England, that all would be well if the good relations between the countries were going to last for ever, but that it is possible the exigencies of international politics would not allow this happy state of affairs to last for ever. If our friendship, engendered perhaps for political reasons, continues to be based on a foundation so unstable, then doubtless it cannot last for ever. But if it increase, if it is rendered more solid by the mutual esteem of the two peoples, resulting from a fuller knowledge by each of the qualities which are inherent in the other, and of the beauties of each other's countries, and from a better understanding by each of the character of the other, then I do not hesitate to say that the friendship will be lasting.

To secure that end, it is necessary that the French should cease to believe that the Englishman is a tall, attenuated individual, with tusk-like teeth, long nails, and plum-coloured whiskers, with a cap on his head, a large check-patterned suit, and big square-toed boots; while the Englishman must give up the idea that Jacques Bonhomme is a coxcomb, surmounted with a flat-rimmed tall hat, who always sports waxed moustache and pointed beard, and wears a tie of the Levalliére type, a long overcoat with flaps flying to the wind, and

trousers like those of a hussar. In a word it is necessary that each of the two peoples should know the other as a reality, and not as a caricature.

People in England talk of La Belle France. What do the immense majority of English people know about it? I was reading lately in a paper on the Tunnel by that eminent engineer M. Sartiaux that, whereas an Englishman travels on an average thirty times a year in his own country, it is only one Englishman in thirty who dares to cross the Channel. The little green ribbon of water is a barrier which seems very insurmountable, and, nevertheless, if one looks across the Channel from Dover on a clear day, Calais seems to be merely at the other side of the street. This difficult barrier can be passed by going underneath. Why not do it? Look first at the objections from the military point of view. Even admitting that they have some validity, does not France give all necessary guarantees? No train from France can emerge from the Tunnel unless the authorities in England permit it. Even if—which is impossible—a train full of soldiers arrived at the English terminus, with their equipment, their artillery or cavalry, they would be greatly embarrassed in trying to disentrain in the narrow space available. But remember that in order to transport even a regiment it would be necessary to have a large number of trains. An invasion of English soil by the Tunnel is an impossibility—even during the week-end.

The military objection is held only by reasons of sentiment. England has such respect for its great men that it will not allow itself to discuss the opinions which they have expressed as axioms. But Lord Wolseley, Mr. Arthur Fell, M.P., wrote to me lately, would not be opposed to the Tunnel at the present day, because the excellent reasons which he had in mind would no longer apply in the present situation. Sentimental also is the objection founded on the necessity of preserving to England its insularity—sentimental, and very badly defined. Those who have urged this objection to the Tunnel have not developed it. I am about, perhaps, to appear very daring in taking up this ground, but who would have the right to put up the famous notice "Trespassers will be prosecuted"? What do the partisans of insularity fear? Is it the more easy entry of ideas and doctrines? But human thought knows no frontiers. It penetrates everywhere at the present moment. And is not England itself, by our very conception of the country, taken to be the country of liberty? Have those opponents of the project then some fear of an extension of the week-end habit to Continental resorts, and the exodus in crowds of the English people to these fortunate places? No one would dare for long to take his stand upon this objection. Is it not the case that in England one judges badly of France? One judges it by certain literature which would not find readers among ourselves, and by cards, postal and others, which would not find buyers. I would go further, and say that one judges it also by cinematograph scenes which are supposed to represent French manners, but which, if produced in France itself, would meet with universal reprobation. Need I add that none of these products are of French origin. Is insularity necessary to preserve intact the manners and character of a nation? Is Brussels less Belgian because it is only four hours' journey from Paris? and is the little Parisian Bourgeoise less different from Mademoiselle Beulmans than she is from Miss Jones or from Gretchen? The Tunnel will bring distant places near. In suppressing an obstacle to travel it will cause preconceived ideas to be abandoned, and it will remove the legendary and absurd opinions which are the inevitable consequences of several centuries of political antagonism.

Finally, I have only to say: Come see us among ourselves, you will know us better, and the great sentimental objection will fall to pieces and disappear. The great moral force of the English people springs from the fact that it sees itself as it is. Our weakness is to make ourselves out to be worse than we are. All that is a question of climate. The task which our great countryman de Lesseps imposed on himself was the suppression of isthmuses. Messrs. Fox and Sartiaux give us the means of suppressing a strait. Let that be done as quickly as possible. That is the resolve which has been formed in the two countries in the century of an unshakable *entente* and an enduring friendship.

Miss JARVIS: May I say that while we are waiting for the Tunnel something might be done to improve the steamers by making them bigger and more spacious, because one suffers so much when going to, or coming from France.

Mr. BREDALL: I am extremely glad that the Channel Tunnel is the principal subject of discussion. If the time ever comes, as I hope it will, when trains will run every half hour between London and Paris, may I be there to see. Undoubtedly the Channel is one of the chief hindrances to travel in France. Many Americans, after crossing the Atlantic, hesitate, in spite of all the attractions of Paris, to attempt the short sea passage.

Mr. W. TURNER PERKINS, Literary Secretary of the Channel Tunnel Company, read a paper on the present state of public opinion in the United Kingdom respecting the proposed Channel Tunnel.

He said: Ladies and gentlemen, Last night you had an opportunity in this hall of hearing an important speech by Baron Emile d'Erlanger, the chairman of the Channel Tunnel Company, on the subject of the proposed Channel Tunnel in its commercial, financial and military aspects, as also an outline of the engineering features of the scheme by Sir Francis Fox, one of the most eminent civil engineers in this country. I have been invited by the Committee of the Franco-British Travel

Union to convey to you what I believe to be the present state of feeling in the United Kingdom regarding this great project. Public opinion on the subject has undoubtedly latterly undergone very considerable change in its favour, as a direct result of the altered conditions of our national defence. The advantages of a submarine connection between England and France, from the point of view of passenger traffic and commercial intercourse, have never been disputed. Military objections alone have hitherto prevented the construction of the Tunnel. Happily there are, at this moment, unmistakeable signs that these fears are rapidly and finally disappearing. Without any appeal from the Channel Tunnel Company, and without the slightest pressure being exercised from any outside source, His Majesty's Government have themselves re-opened the question, by calling for special reports from the departments immediately concerned—the Admiralty, the War Office and the Board of Trade. And we know, on the authority of the Prime Minister, that when these reports have been received, they will be impartially considered by the Committee of Imperial Defence, upon whose recommendation the Government may be expected to act without hesitation.

It was in April last that the revival of the project was officially announced in the House of Commons. Questions were asked on several occasions by Mr. Arthur Fell, who afterwards, by personal inquiry, ascertained that many of his brother members in the House of Commons had abandoned the objections which they formerly entertained, and were now anxious to see the scheme carried out. Mr. Fell has not the remotest interest in the Channel Tunnel Company, or in either of the railway companies associated with it in the enterprise; but being a firm believer in the many benefits which it promises to confer, he has now become one of its stalwart Parliamentary champions.

Twenty-three years have passed since the opinion of the House of Commons was taken on the subject. On that occasion, Sir Edward Watkin's Bill was rejected by 234 to 153. That division has a peculiar significance to-day, notwithstanding the great alteration which has been witnessed in the composition of the Lower Chamber, inasmuch as those who then supported the proposal included the present Prime Minister (Mr. Asquith), the late Sir Henry Campbell-Bannerman, his predecessor in that office, Lord Gladstone, Mr. Lloyd George, now Chancellor of the Exchequer, and Lord Morley, the Secretary of State for India.

As reference is often made to the Joint Committee of 1883—to whose enquiry I listened from start to finish—it is well to recall the fact that the Committee considered it highly probable that if the traffic of the Channel Tunnel were to expand, a time would come when the number of lines would be increased beyond two, and the carrying capacity of the Tunnel proportionately increased . . . "It would be reasonable to anticipate" they said, "an immense development of the passenger traffic." The comparatively small number of persons crossing the Channel convinced the Committee that a large number were deterred by the inconveniences of the sea passage. Similarly the Committee believed that once open the Tunnel "would lead to a large expansion of trade between this country and the Continent."

With regard to the effects which the opening of a Tunnel would produce upon our security as a nation, the Committee had before them the report of the Military Committee, presided over by Sir Archibald Allison, and the evidence of the Duke of Cambridge, Lord Wolseley, and other military officers. The Committee acknowledged that a small body of men emerging from the mouth of the Tunnel in the face of the concentrated fire of the forts by which it would be commanded, could scarcely escape annihilation, and Lord Wolseley, the strongest military opponent, admitted that if sufficient notice were given, "50 men at the entrance of the Tunnel could prevent an army of 100,000 men coming through it." Lord Lansdowne, the Chairman, who was strongly in favour of the scheme, presented a long and singularly able report, in which he examined it in every aspect. Three other reports were submitted, and in the end the Committee, by six to four, expressed the opinion that Parliamentary sanction should not be given to the proposal.

On the other hand, it cannot be forgotten that the scheme had the warm support of Mr. Gladstone, Mr. John Bright, and the late Lord Salisbury. It is impossible to mention the name of Mr. Bright without recalling what will, I hope, prove a remarkable forecast, when, exactly 30 years ago, he used these words *:—"A great deal has been said about our being surrounded by water. Well, I dare say that has its advantages, but it is a great mistake to suppose that our being surrounded with water has kept us at peace. . . . I venture to foretell, though I have not a word to say for the Channel Tunnel—for I know nothing of it and I shall trust to engineers to say whether it can be made, and to capitalists to say whether it will pay—but I do say, be it by steamboats, be it by commercial relations, or be it by a Channel Tunnel, be it anything which will bring the peoples of the Continent into constant communication with the people of this country, that will be much more likely to preserve peace than any of those strange notions that peace is to be preserved by our being kept separate from them . . . When the exhibition of 1851 was held, great preparations were made at the suggestion of the Duke of Wellington, because it was thought that the peace of this City of London might be endangered by the presence of so many Englishmen and foreigners! We all recognise now what a strange idea that was; and with regard to this question of the Channel Tunnel, I do hope that the

* *Mr. Bright's speech in extenso, p. 89.*

people of this country, 20 years hence, will not find subject for condemnation and regret in the course we may now take. Let us in a great question of this kind act coolly, and not under the influence of passion or panic, and then our children will not have anything to regret in the result of our deliberations."

The public are coming more and more to the view which Mr. Bright expressed, and the altered feeling is clearly indicated in the columns of the journals of the day, the vast majority of which now vigorously support the demand for a closer and more constant means of communication between England and France. Many men who have held high and responsible positions in the service of the State have recently modified their opinions on this question, and these I may add, are found among both the chief political parties, as also among those actively concerned in the national defence. The Congress will, I am sure, be pleased to hear an extract which I am permitted to read from a letter recently received from Lord Sydenham, who, as Colonel Sir George Sydenham Clarke, has in many capacities rendered splendid service to the nation, notably as Secretary of the Committee of Imperial Defence, which was established by Mr. Balfour when he was Prime Minister.

Lord Sydenham, writing on the 16th of August last, said:—"I am much obliged to you for sending me the report of the proceedings of the deputation which waited on the Prime Minister. I am glad to see that fresh consideration is promised. In the 30 years that have elapsed since I first supported the Tunnel scheme, there has been a wholesome change of opinion towards the question. The military arguments against it would never stand the least examination, and are opposed to all the experience of war. They rest upon wild conjectures, in which imbecility on the part of the Government and of the people of this country is gratuitously assumed. I think that the military objectors are now less numerous. At the same time, the need for the Tunnel is becoming more apparent to our commercial men, and your position may be strengthened by the fact that you can now depend wholly on Electric Traction, which in certain respects, alters the conditions. I do not know what is proposed as to the generation of the necessary power; but if the French would agree to have the generating plant on this side of the Channel, the fears of the 'old women of both sexes' might be allayed."

I should be glad if the Congress would further permit me to quote a few words from a communication of the late General Sir William Butler, who would have been the first military witness called in support of the Channel Tunnel Bill of 1906, had the desired reference to a Parliamentary Committee been allowed. That distinguished soldier said*:—"The Channel Tunnel has come back to us after a sleep of 25 years, and so have the old nightmares and goblins of that time. •Had the Tunnel from Dover to Calais been made in the eighties, several millions of men, women and children would by this time have passed through it, and the journey under the sea would have become as much a matter of commonplace business as a trip in the 'Tuppeny Tube' from Notting Hill to Oxford Street. Every age is destined to have its particular bogey. In the thirties and forties it was the railroad, a line from London to Portsmouth being, I believe, the chief bogey. It is said that there is in the War Office archives a document from the hand or brain of the great Duke himself, declaring his opinion that a railroad from Portsmouth to London would *dangerously facilitate the movement of a French Army upon the English capital!* The bogey of the sixties was the Suez Canal. 'What!' cried the prophets of pessimism, 'cut the Isthmus of Suez, and enable a ship to pass from the Mediterranean into the Red Sea! Then good-bye to British supremacy in the East.' The bogey-monger has many allies, and the costumes in his theatrical wardrobe are as numerous as they are varied. Nevertheless, he is invariably beaten in the end—a long end, but inevitable. The engineer wins at last—he spans the river, he widens the thoroughfare, he builds the embankment, he pierces the mountain, he severs the isthmus. For the past 40 years Germany, France and Italy have been boring tunnels under the Alps, and nothing terrible has happened . . . If sea power means anything, it means that it could knock into bits the entire area in which a tunnel under the sea emerges upon the land surface. It can command both ends of such a work, and destroy both ends, even if there were not a dozen other ways and means of destroying them, or rendering the Tunnel inoperative for use . . . The French people are not afraid of the Tunnel, and they are right . . . Do not let this great field of a possible conquest by the genius of man over the rude forces of nature be prematurely closed and abandoned, because of old world fears or prejudices."

Another soldier, Colonel Alsager Pollock, has quite recently, in the *Pall Mall Gazette*, declared that "if Lord Wolseley were now alive, he would no longer be an opponent, but a warm advocate of the Tunnel, simply because the general strategical situation has been altered . . . Whether the enterprise is from the commercial point of view likely to prove remunerative or not, is," he says, "a comparatively small matter, for it has become, in the naval conditions of the present time, a strategical necessity." "It is to us and to France," Colonel Pollock adds, "of vital importance that communication across the Channel should not be liable to interruption."

You may take it as certain, ladies and gentlemen, that the Channel Tunnel would speedily create an entirely new volume of international traffic without in any material degree diminishing the cross-Channel

* *General Sir William Butler's article, pp. 62, 63.*

steamship services. Consequently it will further the aim of the Franco-British Travel Union, and upon this point I should like to read a letter with which I have been favoured by Messrs. Thomas Cook & Son, the well-known tourist agents and bankers, who write as follows:—

"As to our own views on the subject, we have for some time felt that the question of the Channel Tunnel has been coming to the front again, and we think, with every prospect of the undertaking being carried out ere long. With regard to the great benefits to be derived by all concerned from such an improved means of communication between the Continent, as a whole, and this country, we think, apart from the strategical point of view, there can be no doubt whatever. It is obvious to all familiar with the conditions of traffic in different parts of the world that through communication between the Continent and beyond must inevitably, and very largely, develop both passenger and goods traffic to and from this country, more especially in the case of passengers from the Continent to this country; and it is an undeniable fact that a much larger number of foreigners would visit this country were it not for the inevitable and often rough sea passages.

"With regard to ferries, these have been proved to work well under conditions where only a few 'through' cars have to be transferred, and where the tidal variations are not so large as on our own shores. In our view, the problem of using ferries in connection with our short sea routes, where sometimes three or four long trains would have to be transported in a short time across the Channel, presents difficulties which may be found insuperable in practice."

I am honoured by a similar communication from Mr. Robert Mitchell, the director of the Polytechnic Touring Association, which annually conveys large numbers of travellers to nearly every part of Europe. Writing to me last week, Mr. Mitchell said:—"In reply to your letter, I am entirely in favour of the construction of the Channel Tunnel; I cannot conceive of it having anything but the greatest possible beneficial effect, not only upon commerce and tourist traffic to and from the Continent, but also upon the friendliness of the two nations principally concerned. A model of the proposed approaches to the Tunnel has been on view in the vestibule of the Polytechnic for the last three months, where it has excited considerable interest. There was scarcely one among the number of those who inspected it who was not in favour of the construction of the Tunnel."

Let me, in conclusion, ladies and gentlemen, remind you that Queen Victoria and the Prince Consort gave their ungrudging support to the construction of a submarine railway between England and France, and that at a time when the resources of science were not nearly so far advanced as they are to-day. And we may all legitimately cherish the hope that, by continued royal favour, and with the hearty concurrence of all classes of their Majesties' subjects at home and in the dominions across the seas, the beneficent reign of King George and Queen Mary may, among its most inspiring and memorable records, be enshrined in history as that in which sanction was given to a project calculated to prove the greatest instrument of peace that the British Parliament has ever forged.

Mr. W. HANNING (ex-President of the British Chamber of Commerce in Paris): I beg to propose the following resolution: "That this Congress, considering the importance of the proposed Tunnel in the relations of Great Britain with the whole Continent, expresses the hope that the British Government may see their way to approve the scheme, which is now being so very favourably received by the people of this country; and it expresses great satisfaction that the project has been submitted for consideration to the Committee of Imperial Defence."

I have the great honour of being present at the Congress to-day on behalf of the British Chamber of Commerce in Paris, of which I am President, and I am very pleased to see among the audience my old friend and predecessor, Sir Thomas Barclay. He will know that any project which will tend to the development of Franco-British relations has always received the sympathy and support of our Chamber ever since its formation over forty years ago. I happened to be present as delegate from this Chamber at the Autumnal meeting of the Chambers of Commerce of the Empire, which was held in Antwerp on Tuesday last, and I had the honour there of seconding the resolution in favour of this Channel Tunnel, which was submitted to the meeting by my friend Mr. Stanley Machin, of the London Chamber of Commerce. He made a very remarkable speech in support of this project, but unfortunately he was addressing a Congress which was entirely with us. I mean to say that he was preaching to converted people, and consequently he was somewhat interrupted in his remarks, as I was myself in my subsequent remarks, and I am making this little explanation as I think that in some quarters of the Press here and there the interruptions were wrongly interpreted. The interruptions referred to were merely the calling out of the words "agreed to," which meant to say that the Chambers represented at the Congress, some 70 or 80 Chambers, representing the principal manufacturing and industrial towns of England, eager to get on to the more social and more agreeable occupations of the day, interrupted Mr. Machin and myself with the words "agreed to." They agreed with the resolution, and they wanted it passed immediately. On being put to the meeting it was passed unanimously. It is desirable to make that point clear, as that little incident was wrongly interpreted in some portions of the Press in England.

Personally, I am attending the Congress as an old supporter of the scheme. I have had the honour of co-operating with my friend M. Sartiaux, of the Chemin de Fer du Nord, and with my friend M. Sire, six or seven years ago, when the project was opened for consideration. I think, as do all the British residents in Paris, that the Tunnel, when once constructed, will considerably increase the relations, both social and commercial, between the two countries; and the figures which were submitted to the meeting last evening by Baron d'Erlanger and Sir Francis Fox are sufficient to show the great importance that is attached to the project. We who are British residents in France sympathise entirely with the construction of the Tunnel, and we believe that the Committee of Imperial Defence is favourable to the project.

Sir THOMAS BARCLAY: I have pleasure in seconding this resolution. My connection with the Paris Chamber of Commerce is getting old now, and I am almost an independent person at the present moment in seconding this resolution. The Channel Tunnel question is a very old study of mine. In 1907 I published a series of articles which were reprinted by the South Eastern and Chatham Railway Company, and circulated in favour of the construction of the Tunnel. But I took care at that time, and I wrote to M. Sartiaux in the same sense, to warn all the advocates of the Channel Tunnel that the time was not yet come to advocate the construction of the Tunnel, as I happened to know provincial England well, and that provincial England was not favourable to the Tunnel, at least the opinion in the North of England was distinctly unfavourable to it. When I was fighting a constituency in the North of England a few years later I never ventured to speak of the Channel Tunnel, because the feeling against it was not, I cannot say strong, but indifferent, and the prevalent idea was that anybody who advocated the Channel Tunnel was a faddist, and more—somebody to whom it was not safe to entrust the destinies of the country. Whether that is the opinion in the North of England at the present moment I would not venture to say. I hope it is not, and I believe it is not. But in this morning's *Manchester Guardian* I see the reports of last night's speeches among the financial news, which shows that this is still regarded in the North of England as a financial project. That is the danger which we who are in favour of the construction of the Tunnel have to meet. It must not be regarded as a financial project from the point of view of the English people. It is a financial project from the point of view of those who put their money into it, but not from the point of view of the British people, which is a wise people. It will never commend itself as a financial project. It must be regarded entirely from the point of view of the British political and industrial interest. That is the attitude which we have to take up.

I maintain that from the political point of view the Tunnel has an immense interest. It is not I who will ever travel by it, if those beautiful boats which now conduct the traffic are not suppressed. It is one of the delights of my life to cross the Channel in one of these new boats. Therefore, from the point of view of sea-sickness, I do not think we shall get much sympathy from the British side with regard to the construction of the Tunnel. But where we shall get sympathy on the British side is when we speak of the great political and industrial interests which would be served by it. I am not going to speak of the military aspect of the matter. I am a man of peace. But the great political interest is to become greater friends and have more extensive relations with each other, we can go on increasing these relations still more and more. We could, if the Tunnel were constructed, supply England with larger quantities of good French food, good fresh eggs, slaughtered meat for the London market, and many other things. All this traffic would be facilitated enormously by the non-breaking of bulk between the countries. There is another interesting point. One can always find in London a ship going to any particular port. Ships can be found here to a much greater extent than at Antwerp, Rotterdam or Hamburg. Therefore, in the case of certain classes of goods exported from the Continent to foreign ports, the attraction of London would be enormous if there were through communication with London by rail, as by sending them to London there would often be a saving of three weeks or a month in the delivery of the goods at the distant port to which they were consigned. From the point of view, therefore, of politics and industry the construction of the Tunnel presents enormous advantages. I have selected a list of all the objections which I have been able to find advanced to the project, and I think that if experts would meet and answer these objections it would be a most useful thing for the enlightenment of the man in the street, who is the final judge in the matter.

The resolution was put, and adopted unanimously, amid cheers.

THE ENTENTE TUBE.

STEWARD (*on night-Channel boat*): "IF THEY BRING IN THIS 'ERE TUNNEL, MY JOB'S GONE."
MR. PUNCH: "THAT'S THE ONLY SOUND OBJECTION I'VE HEARD YET."

At the Annual Dinner of the same Congress, held at the Hotel Cecil, on Friday, 26th September, 1913, SIR THOMAS H. ELLIOTT, K.C.B. presiding,

Lieut.-Col. Sir ALBERT ROLLIT, LL.D., D.C.L., ex-President of the Association of Chambers of the United Kingdom, as also of the London and Hull Chambers, and formerly a Director of the British Chamber of Commerce in Paris, called upon to propose "The Franco-British Travel Union," was received with much applause. He said:—The honour is great of being asked to propose what Mr. Robert Donald has just called "The Toast of the Evening"—The Franco-British Travel Union. As President of one of its Sections, I venture to say that our Congress has achieved very much, and that very successfully. It is only by organization, by men plus machinery, that great results can be secured, for what is everybody's business is nobody's business, and, individually, little impression can be made on Governments and Departments of State, and Corporations, and Railway and other Companies, without souls to be saved or bodies to be kicked, while to numbers they will be accessible and attentive. Andrew Marvel, a great townsman of mine, wrote: "How much one man can do, if he both act and know." This was centuries ago, and now we find how much more many men can do, if they pull together, if they work each for all, and all for each, in toil co-operant to an end, and this we call organization—(applause). Then they can evoke the *Deus ex machinâ*, and exorcise the demon of disunion and destruction. Such are our objects, and through them to cultivate Travel and Travellers between Britain and France. This has my sympathy. When I was a resident in both London and Paris, I spent very many week-ends in France, and how I prayed for a Channel Tunnel, the want of which is the misery of millions, the biliousness of billions, and the trial of trillions—(laughter). I am never able to lunch economically on the chops of the Channel—(laughter). As Mrs. Malaprop said, "Give me terra cotta"—(laughter). There was once a Judge Channel, and a good judge too, but he swallowed his h's. He was trying the case of the wreck of the ship *Hebe* on the Varne sand, in the Channel, and in giving his judgment kept calling her the *'Ebe*. One of the advocates, who had left the Court, rushed in and said to his junior counsel: "What's become of the *Hebe?*" "Haven't you heard?" was the reply; "she's just been lost in the chops of the Channel"—(laughter). No wonder that at our recent meeting of the British Chambers of Commerce at Antwerp they all agreed with me that we ought to have the Tunnel—(applause). A great work of peaceful penetration, and one far better than the peaceful penetration of sitting on bayonets. (Hear, hear.)

And you Frenchmen add to the Channel's horrors by your examinations of *grands* baggages, *petits* baggages, and your octrois, making one almost prefer to be lost in the Channel. Your douanes, and, to a less extent, ours, are terrible incidents of travel. The ancient Romans called their military baggage "impedimenta," and all such things are impediments to travellers—(applause)—and especially to ladies, who love to defeat your douaniers—(laughter). Only the other day, near Lille, the douane detained the luggage of one of our Cabinet Ministers, and his wife and daughter, and, worse, my own, and compelled the Minister to go and dine and speak at a banquet at Ghent in a light tweed suit, and prevented my going at all rather than make an exhibition of myself at the Ghent Exhibition—(laughter). Your French douanes are the worst because you have to search for such multitudes of contrabands of peace—(laughter). How much better would it be to create a real unity of the nations by renewing Cobden's Anglo-French Commercial Treaty of 1859, which doubled the trade between the two countries in a decade! (applause). Then commercial travellers could afford to treat themselves like commercial Tarquins—(laughter). This, too, would benefit and encourage, by making more travellers, no longer deterred by obstacles, good hotels, and prevent its being necessary to act on the suggestion in your Programme, of going to Boarding Houses, the landlady of one of which, having agreed terms with a customer, was told by him that, being a vegetarian, he must have some reduction, and met with the rebuff: "Oh, then, may I ask whether you're one of them new-fangled things as they calls herbaceous boarders, because we don't take them in?"—(laughter)—a form of words from which to infer that other boarders might be "taken in"—(laughter). But there are both paying and non-paying guests, like people of whom it may be said that it is not their principle to pay their interest, nor their interest to pay their principal—(laughter)—and that landlady may have suspected her proposed guest of being one of the latter. And I think good hotels—for bad ones are deterrent—are increasing. Once I went into a Spanish one at Baja, in the Sierra Nevada, where the politeness was overwhelming, but the provision execrable; and once when in Canada some American friends, used to excessive menus, and I, went into an hotel and saw the bill of fare, the Americans exclaimed to the waiter, who asked what he should bring, "Wall, say, you'd best begin by bringing all you hev"—(laughter).

Another impediment to travel is much ignorance of foreign languages, and this the Union will seek to remove, for which there are various means. I once

read abroad an advertisement—'Wanted an English groom, partly for the sake of his English conversation'—(laughter). Well, the Union will help people to learn languages, to triumph over your French irregular verbs, and vast superfluity of genders, and you French people to grasp the perplexities of our spelling and composition in the third person singular and plural. We English ought certainly to know more French, seeing that we have millions of fellow Britishers who only speak the French of Louis XIV, and who are represented at this banquet by my friend the Agent-General for Quebec, at the University of which picturesque old city I could not find a single person who spoke English; and when our boys' knowledge of William the Norman, asked when the Conqueror ascended the throne, led him to say: "I don't know, teacher; but I can get to know, for I know his telephone number is 1066 Hastings,"—(laughter). Finally, when, to use words of the Marriage Service, all unjust causes and impediments are removed, there will be opened up to travellers and trade both commerce and culture, and to tourists the most delightful enjoyments and recreations. To Frenchmen how the greenery of England, fresh fields and pastures new, its foliage, and the garden of England, Kent, will appeal on emerging from the Tunnel!

All foreigners admire the English turf. The English lawns were awarded by us Judges the Grand Prix at the Ghent Exposition; and, when some American tourists admiring the green quadrangle of Christchurch College at Oxford, asked the custodian whether it was difficult to make, he said: "Oh, no; just spread good loam, sow the best seed, water, and roll it." "Oh, then," said the tourists, "we will have one at home at once." "But, by the by," replied the custodian, "I ought perhaps to have added that this lawn has been rolled for hundreds of years, and that is why it is so green"—(laughter). Again at the very gate of England, at the door of, London, is that Thames Valley, even with its limitations one of the most beautiful resorts in the world—river, forest, castle, the stream of history and of trade, justifying the Lord Mayor of London who, when James II. had taken from the City all its charters and nearly all its liberties, fell on his face and sarcastically said: "Will your Majesty please to leave us the Thames?"—(laughter). Then we have Scotland's wealth of wildness and of beauty; the Emerald Isle, with its lakes and Macgillicuddy Reeks, its blarney and its brogue(laughter). In return, multitudes more Englishmen will see the Rhone Valley, and Lyons, where we at the London Chambers of Commerce are doing our utmost to help the Municipal and Civic Exposition next year, as we did for Brest this year. Of the Pyrenees, and of the need for their development in summer and winter seasons I have already spoken, and I am glad to have the assurance from the representative of Vernet-les-Bains at the Congress that this is proceeding, and certainly Vernet-les-Bains has set a great example of enterprising development—(applause). Then who can describe your French Riviera, with its sea of emerald and its throbbing bays and gulfs of palpitating sapphires? Even your French Colonies join your movement. The Mayor of Algiers, that land of Deys and Beys, is with us to-night—(applause)—and, distant as is his home, great attractions lie beyond it—Biskra, an oasis in the desert, whose Garden of Allah my friend Mr. Robert Hichens has so poetically pictured for us. No wonder, with such materials, your Union has offered prizes for posters to depict them, since, though Shakespeare does not exactly say so, it is nevertheless as true as if he did—"Sweet are the uses of advertisement"—(laughter). And your Union will also promote the improvement of rails, roads,—that no evil communications may corrupt good manners by giving cause for cursory remarks—but that men may mend their ways—(laughter)—and also telegraphs and telephones, though I think the ladies might do the work of these as well, or even better, for there is a new speedometer which makes these degrees of comparison in spreading news—the Tel-a-graph, Tel-a-phone, and—Tell-a-Woman—(laughter)

Let us, then, with one accord strive to strengthen the Anglo-French accord, *L'Entente cordiale*, based on fair and frank friendship with France and with Frenchmen—(applause). For *L'Union fait la Force*, and our hope and prayer to the God of Battles is that the sword may keep the sword in the scabbard, and that the two great Western Powers may triumph not by the right of might, but by the might of right—(applause). I have to associate the toast with the name of my old Parliamentary friend, with whom I sat in the House of Commons for some twenty years, and who is now the Mayor of Cheltenham, one among the many Mayors (French and English) here present, the Mayor of Algiers, the Mayor of Folkestone, myself once the Mayor and Sheriff of Hull, and others. And Cheltenham reminds me of some well-known Tourists who travelled from Epsom to that celebrated cure-place, and whose epitaph is said to be in Cheltenham Churchyard:—

> "Here lies I and my three daughters;
> We died of drinking of the Cheltenham Waters;
> Now if we'd stuck to Epsom Salts,
> We shouldn't have been lying in these here vaults."—

(laughter). I now propose, with all honour, the toast of "The Franco-British Travel Union," and the good health of Mr. Agg-Gardner, M.P., Mayor of Cheltenham—(loud applause).

THE CHANNEL TUNNEL.

TREATY BETWEEN ENGLAND AND FRANCE.

Project adopted on the 30th May, 1876, by the International Commission of the Submarine Railway "to serve as a basis for the Treaty to be concluded between France and England concerning the Channel Tunnel and Submarine enterprise."

Projet adopté le 30 mai 1876 par la Commission Internationale du Chemin de Fer sous-marin "Pour servir de base au traité à conclure entre la France et l'Angleterre relativement à l'entreprise du Tunnel et du Chemin de Fer Sous-marin."

The undersigned, the Commissioners appointed by the Governments of Great Britain and France to consider the conditions upon which the two Governments should, by means of a Treaty for that purpose, come to an understanding with respect to the proposed Tunnel and Submarine Railway, met at Paris from the 29th of January to the 5th of February, and at London from the 22nd to the 30th of May, 1876. After having considered and discussed the various questions to be dealt with in connection with this enterprise, they submit to the two Governments the accompanying Memorandum which they recommend should be adopted as the basis of the proposed Treaty between Great Britain and France with regard to the said Tunnel and Railway.

H. W. TYLER.
C. M. KENNEDY.
HORACE WATSON.
CH. GAVARD.
C. KLEITZ.
A. DE LAPPARENT.

Les Commissaires soussignés, nommés par les Gouvernements de France et de la Grande Bretagne pour examiner à quelles conditions les deux Puissancel pourraient s'entendre, par le moyen d'un Traité spécias relativement au projet de Tunnel et de Chemin de Fer Sous-marin, se sont réunis à Paris du 25 janvier au 5 février, et à Londres du 22 au 30 Mai, 1876.

Aprés avoir examiné et discuté les diverses questions qui se rattachent à cette entreprise, ils viennent soumettre aux deux Gouvernements le projet ci-joint qu'ils proposent pour servir de base au Traité à conclure entre la France et l'Angleterre relativement à l'entreprise du Tunnel et du Chemin de Fer Sous-marin.

(Signé)
CH. GAVARD.
C. KLEITZ.
A. DE LAPPARENT.
H. W. TYLER.
C. M. KENNEDY.
HORACE WATSON.

Memorandum.

1. The boundary between England and France in the Tunnel shall be half-way between low-water mark (above the Tunnel) on the coast of England, and low-watermark (above the Tunnel) on the coast of France. The said boundary shall be ascertained and marked out under the direction of the International Commission to be appointed, as mentioned in Article 4, before the Submarine Railway is opened for public traffic. The definition of boundary provided for by this article shall have reference to the Tunnel and Submarine Railway only, and shall not in any way affect any question of the nationality of, or any rights of navigation, fishing, anchoring, or other rights in, the sea above the Tunnel, or elsewhere than in the Tunnel itself.

Projet.

1. La frontière entre l'Angleterre et la France dans le Tunnel sera fixée au milieu de la distance séparant la ligne des basses eaux (au-dessus du Tunnel), sur la côte d'Angleterre, de la ligne des basses eaux (au-dessus du Tunnel) sur la côte de France. Avant la mise en exploitation du Chemin de Fer Sous-marin, la susdite frontière sera déterminée et tracée sous la direction de la Commission Internationale qui sera instituée ainsi qu'il est dit à l'Article 4. La définition de frontière faisant l'objet du présent Article s'appliquera uniquement au Tunnel et au Chemin de Fer Sous-marin; elle n'aura aucun effet relativement aux questions de nationalité, de droits de navigation, de pêche, et d'ancrage ou autres droits sur la mer au-dessus du Tunnel ou ailleurs que dans le Tunnel même.

2. The French section of the Submarine Railway shall be constructed, maintained, and worked in conformity with the French laws, and with that of the 2nd August, 1875, in particular, subject to the provisions of the Treaty to be concluded between the two Governments. The English section of the Submarine Railway shall, subject to the provisions of the Treaty to be concluded between the two Governments, be constructed, maintained, and worked in accordance with such conditions as Her Majesty may by Order in Council hereafter impose in connection with the undertaking of the said Company (as specified in the Channel Tunnel Company, Limited, Act, 1875), with such, if any, modifications as may hereafter be made by Act of Parliament.

3. Within five years from the 2nd of August, 1875, the French Company shall be bound to conclude an agreement in writing with an English Company, and reciprocally the English Company shall be bound to conclude an agreement in writing with a French Company, with a view to the construction, maintenance, and working of the Submarine Railway.

This term "Submarine Railway" applies throughout the present Protocol to the Tunnel, to the Railway, and to all the works connected therewith, such railway being bounded in France by its junction with the railway from Boulogne to Calais, and in England by its junctions with the South-Eastern and London, Chatham and Dover Railways.

This term does not include the works mentioned hereafter in Article 16.

4. There shall be constituted an International Commission to consist of six members, three of whom shall be nominated by the British Government and three by the French Government.

The International Commission shall advise the two Governments on all questions relating to the construction, the maintenance, and the working of the Submarine Railway, and shall have power, on giving notice to the respective Companies, to make such inspections as they consider necessary, and the Companies shall be bound in every way to facilitate such inspections, and to cause their delegates to be present.

Each Company shall render annually to its Government an account of its receipts and expenses in such form as the Governments shall approve, after hearing the International Commission, and shall, if required, afford to its Government the necessary facilities for comparing such accounts with the books of the Company.

If at any time any difference shall arise between the two Companies as regards the construction, maintenance, or working of the Submarine Railway, such difference shall be settled by the two Governments after having taken the opinion of the International Commission, subject to such legal actions as the Companies may bring

2. La section Française du Chemin de Fer Sous-marin sera construite, entretenue, et exploitée conformément aux lois Françaises, et notamment à celle du 2 Août, 1875, sous réserve des dispositions du Traité à conclure entre les deux Gouvernements. La section Anglaise du Chemin de Fer Sous-marin sera, sous réserve des dispositions du Traité à conclure entre les deux Gouvernements, construite, entretenue, et exploitée conformément aux conditions que Sa Majesté pourra, dans la suite par un Ordre en Conseil (by order in Council) imposer relativement à l'entreprise de la dite Compagnie (comme cela est spécifié dans "The Channel Tunnel Company, Limited, Act, 1875"), avec toutes les modifications qui pourront y être introduites ultérieurement par Acte due Parlement.

3. Dans un délai de cinq ans à partir du 2 Août, 1875, la Compagnie Française sera tenue de passer un contrat avec une Compagnie Anglaise et, réciproquement, la Compagnie Anglaise sera tenue de passer un contrat avec une Compagnie Française en vue d'exécuter, d'entretenir, et d'exploiter le Chemin de Fer Sous-marin.

Cette dénomination de Chemin de Fer Sous-marin s'applique, dans tout le présent Protocole, au Tunnel, à la ligne et à tous les ouvrages et immeubles qui en dépendent, la dite ligne ayant pour limites, en France, sa jonction avec le Chemin de Fer de Boulogne à Calais, et en Angleterre, ses jonctions avec les Chemins de Fer South-Eastern et London, Chatham and Dover.

Cette dénomination ne comprend pas les travaux mentionnés à l'Article 16 ci-après.

4. Il sera institué une Commission Internationale composée de six membres, dont trois seront nommés par le Gouvernements Anglais, et trois par le Gouvernement Français.

La Commission Internationale donnera *son avis* aux deux Gouvernements sur toutes les questions relatives à la construction, à l'entretien, et à l'exploitation du Chemin de Fer Sous-marin. Elle aura le droit, en donnant avis aux Compagnies respectives, de faire toutes les inspections qu'elle jugera convenables, et les Compagnies devront faciliter ces inspections de toutes manières et s'y faire représenter par des délégués.

Chaque Compagnie présentera à son Gouvernement un compte annuel de ses recettes et de ses dépenses, sous la forme qui sera approuvée par les Gouvernements, la Commission Internationale entendue ; et, si elle en est requise, elle devra fournir à son Gouvernement les facilités nécessaires pour la comparaison de ces comptes avec les livres de la Compagnie.

Toute difficulté entre les deux Compagnies, relativement à la construction, à l'entretien, et à l'exploitation du Chemin de Fer Sous-marin, sera tranchée par les deux Gouvernements, sur l'avis de la Commission Internationale, sous la réserve des actions juridiques que les Compagnies pourraient exercer conformément

in conformity with the Conventions concluded between them and with the legislation of the two countries.

The Commission shall meet at all times when it shall consider it convenient to do so, and at least twice in each year. It shall also meet at any time at the request of either Government. But no meeting shall be valid unless there be present at least two members appointed by each Government. If at any meeting of the International Commission the members present of the one nationality shall differ in opinion from the members present of the other nationality, reference shall be made to the respective Governments.

The International Commission shall report every year to the respective Governments, both upon its own proceedings and upon questions connected with the Submarine Railway. It shall, moreover, submit to the two Governments its proposals for Supplementary Conventions with respect—

(*a*) To the apprehension and trial of alleged criminals for offences committed in the Tunnel or in trains which have passed through it, and the summoning of witnesses.

(*b*) To Customs, police, and postal arrangements, and other matters which it may be found convenient so to deal with.

5. On the completion of the Submarine Railway the International Commission shall cause it to be inspected as they may see fit on behalf of the two Governments, and after such inspection, and on receiving from the International Commission their recommendation in writing, but not before, the Submarine Railway shall be opened for traffic.

6. One set of regulations shall be applicable to the Submarine Railway as a whole; the regulations to be subject to the approval of the two Governments on the recommendation of the International Commission; the tariff of maximum charges shall be fixed in accordance with the Tariff hereto annexed.

7. Each Company shall be responsible for keeping in good and substantial repair the portion of the Submarine Railway situated within its own country; and in case of default, the two Governments, on the recommendation of the International Commission, shall have power, each in its own country, to execute, as may seem right, all necessary works and repairs. The two Governments shall also have power, each in its own country, to receive all moneys payable to the Companies, until the expenses of such works and repairs are covered. These moneys shall be collected in each country in accordance with the existing laws.

8. The concession granted by each Government shall be for a term of ninety-nine years from the opening of the Submarine Railway. At the date fixed for the termination of the concession, or at an earlier period,

aux Conventions conclues entre elles et à la législation des deux Etats.

La Commission se réunira, toutes les fois qu'elle le jugera convenable, et au moins deux fois par an. Elle se réunira aussi à toute époque, à la demande de l'un ou l'autre des Gouvernements. Mais elle ne pourra délibérer valablement qu'autant que deux membres, au moins, de chaque nationalité seront présents. Si, à une réunion de la Commission Internationale, les membres présents d'une nationalité sont d'une opinion contraire à celle des membres présents de l'autre nationalité, il en sera référé aux Gouvernements respectifs.

La Commission fera, chaque année, un rapport aux deux Gouvernements, tant sur ses propres travaux que sur les questions qui se rattachent au Chemin de Fer Sous-marin. Elle soumettra, d'ailleurs, aux deux Gouvernements ses propositions pour des Conventions supplémentaires relatives—

(*a*) A l'arrestation et au jugement des accusés pour délits commis, soit dans le tunnel, soit dans des trains y ayant circulé, et à la citation des témoins.

(*b*) Aux dispositions de douanes, police, et postes, et autres matières que l'on jugera utile de traiter.

5. Après l'achèvement du Chemin de Fer Sous-marin, la Commission Internationale fera procéder de la manière qu'elle jugera convenable, et au nom des Gouvernements, à l'inspection du Chemin de Fer Sous-marin. Après cette inspection et sur la remise d'un avis favorable de la dite Commission, consigné par écrit, et non auparavant, le Chemin de Fer Sous-marin pourra être livré à l'exploitation.

6. Une série de règlements devra être appliquée au Chemin de Fer Sous-marin dans son ensemble. Les règlements devront être approuvés par les deux Gouvernements sur l'avis de la Commission Internationale. Le maximum des prix sera déterminé conformément au tarif ci-joint.

7. Chaque Compagnie sera responsable du maintien en bon état d'entretien de la portion du Chemin de Fer Sous-marin située dans son propre pays, et, à son défaut, les Gouvernements, sur l'avis de la Commission Internationale, auront le pouvoir, chacun dans leur pays, d'executer, comme ils le jugeront convenable, tous les travaux et réparations nécessaires. Ils auront également le droit, chacun dans leur pays, de percevoir toutes sommes payables entre les mains des Compagnies respectives, jusqu'à concurrence des dépenses des dits travaux et réparations. Cette perception se fera, dans chaque pays, conformément aux lois existantes.

8. La concession sera accordée par chaque Gouvernement pour une période de 99 ans, à partir de la mise en exploitation du Chemin de Fer Sous-marin. A la date fixée pour l'expiration de la concession, prononcée dans

in the event of the forfeiture of the concession, pronounced in the manner laid down in Article 10 below, each Government shall become possessed of all the rights of the Company, established on its territory, in and over to the Submarine Railway in such country, and shall enter immediately into enjoyment of all the revenues of the Company.

The Company, in each country, shall be bound to hand over to the Government in a good state of repair the portion of the Submarine Railway in such country.

During the five years preceding the date fixed for the end of concession, the Government of each country shall have the right to receive the revenues of the Company established in its own country, in order to apply them to the maintenance of the said portion, unless the Company takes steps to carry out this engagement fully and entirely.

With regard to the rolling stock, movables, and stores of all kinds, the furniture and tools of workshops and stations, each Government shall be bound, at the request of the Company, established in its own country, to take all the above-mentioned objects at a valuation, which shall be made in such manner as may be provided by the laws of the country; and reciprocally, if the Government requires it, the Company shall be bound to give up, under the same conditions, the rolling stock and other things above mentioned.

The Government, however, will only be bound to take over the stores necessary for working the railway for six months from the end of the concession.

9. The works of exploration shall be commenced within one year from the 1st July, 1876.

If within five years from the 2nd of August, 1875, the concessionnaires have not been able to conclude the agreement referred to in Article 3, or if, in consequence of the result of the borings and other preparatory works, they recognize the impossibility of carrying out the undertaking, the Companies shall have the right of abandoning the concessions.

Within five years from the 2nd of August, 1875, each Company is to declare to its own Government whether such Company proposes to retain the concession. This period of five years can, however, on the application of the Company, be extended in either country by the Government, at its discretion, for three further years, that is to say, for eight years from the 2nd August, 1875.

In default of such declaration having been made by either Company within the above periods, and also if either Company should declare its intention of abandoning the undertaking, the concession to the Company making such default or declaration shall be considered as null and void; and action shall be taken in accordance with the provisions of Article 10. If one of the two Companies abandon its concession, the two Governments

les formes prescrites par l'Article 10 ci-après, chacun des Gouvernements sera mis en possession de tous les droits que la Compagnie établie sur son territoire possède sur le Chemin de Fer Sous-marin dans ce pays, et entrera immédiatement en jouissance de tous les revenus de la Compagnie.

La Compagnie, dans chaque pays, sera tenue de livrer au Gouvernement, en bon état d'entretien, la portion du Chemin de Fer Sous-marin située dans ce pays.

Dans les cinq années qui précéderont la date fixée pour l'expiration de la concession, le Gouvernement de chaque pays aura le droit de percevoir les revenus de la portion du Chemin de Fer Sous-marin dans son pays pour les appliquer à l'entretien de la dite portion, si la Compagnie ne se mettait pas en mesure de satisfaire pleinement et entièrement à cette obligation.

Quant au matériel roulant, au mobilier et aux approvisionnements de toute nature, aux appareils et outils garnissant les ateliers et les stations, chaque Gouvernement sera tenu, sur la demande de la Compagnie établie sur son territoire, d'acquérir les objets ci-dessus désignés, suivant une évaluation qui sera faite conformément aux lois du pays; et, réciproquement, si le Gouvernement le demande, la Compagnie sera tenue de livrer, dans les mêmes conditions, le matériel roulant et autres objets ci-dessus désignés.

Toutefois, le Gouvernement ne sera tenu d'acquérir que les approvisionnements nécessaires pour l'exploitation pendant six mois, à partir de l'expiration de la concession.

9. Les travaux d'explorations devront être commencés dans un délai d'un an à partir du 1er juillet, 1876.

Si, dans un délai de cinq ans à partir du 2 Août, 1875, les concessionnaires n'ont pu réussir à passer le contrat mentionné dans l'Article 3, ou si, par suite du résultat des sondages et autres travaux préparatoires, ils reconnaissent l'impossibilité de donner suite à l'entreprise, les Compagnies auront le droit de renoncer aux concessions.

Dans un délai de cinq ans à dater du 2 Août, 1875, chaque Compagnie devra déclarer à son Gouvernement si elle a l'intention de conserver la concession. Ce délai de cinq ans pourra néanmoins sur la demande de la Compagnie et si le Gouvernement le juge convenable, être prorogé, dans chaque pays, de trois années, ce qui portera sa durée totale à huit années à partir du 2 Août, 1875.

Faute par l'une ou l'autre Compagnie d'avoir fait la déclaration dans le délai ci-dessus mentionné, et aussi dans le cas où l'une ou l'autre des Compagnies déclarerait qu'elle a l'intention d'abandonner l'entreprise, la concession accordée à la Compagnie qui se serait placée dans l'un de ces deux cas sera considérée comme nulle et non avenue, et il sera procédé conformément aux dispositions de l'Article 10. Si une seule des deux Compagnies

shall consult as to the measures to be adopted, without the other Company being entitled to raise any objection or to lay claim to any indemnity.

Twenty years, to date from the day on which the Company shall declare its intention to retain the concession, shall be allowed for the completion of the Submarine Railway and the opening of the said railway for public traffic.

10. At the expiration of each of the periods mentioned in the preceding Article, the Companies shall cease to have the right to commence or to execute the works which should have been commenced or executed within the period which has so expired, and if at any time after the works have been commenced the Companies shall for a period of one year, without such cause as the respective Governments, after hearing the International Commission, may consider reasonable, cease to carry on the works, and if the Submarine Railway be not opened for public traffic before the expiration of the period of twenty years mentioned in the preceding Article, or if at any time the Companies, without such cause as the respective Governments, after hearing the International Commission, may consider reasonable, cease for a period of six months to work the Submarine Railway, in conformity with the rules laid down by their Governments, then, and in any of such cases, the concessions granted to the Company in fault shall be liable to forfeiture, which forfeiture shall be enforced according to the laws for the time being of each country respectively.

The forfeiture can only be pronounced by a Government against a Company after the necessity of that forfeiture has been recognized by the joint agreement of the two Governments on the recommendation of the International Commission.

11. Each Company may, at any time during the construction of the works, abandon its concession, on proving to the satisfaction of its Government the impossibility of continuing the said works.

In such case, forfeiture shall be declared and enforced according to the provisions of the Law granting the concession in France or of the Act of Parliament in Great Britain.

12. At any time after the end of thirty years from the opening of the Submarine Railway, each Government shall have the right to purchase the undertaking of the Company established on its territory. This right shall not, however, be exercised excepting after a joint agreement between the two Governments, and after six calendar months' notice in writing has been given to the Companies. In the event of purchase, the rights of each Government in and over the soil, works, and undertaking shall be limited to its own territory, as defined in Article 1.

renonce à la concession les deux Gouvernements aviseront aux mesures à prendre sans que l'autre Compagnie soit admise à élever aucune réclamation ni à prétendre à aucune indemnité.

Vingt ans, à partir du moment où la Compagnie aura déclaré vouloir conserver la concession, seront accordés pour l'achèvement du Chemin de Fer Sous-marin, et la mise en exploitation du dit Chemin de Fer.

10. A l'expiration de chacun des termes mentionnés dans l'Article précédent, les Compagnies cesseront d'avoir le droit de commencer ou d'exécuter les travaux qui auraient dû être commencés ou exécutés dans la période expirée ; et, à toute époque après le commencement des travaux, si les Compagnies cessent, pendant une période d'un an, sans un motif jugé valable par les Gouvernements respectifs, la Commission Internationale entendue, de poursuivre les travaux, et si le Chemin de Fer Sous-marin n'est pas mis en exploitation avant l'expiration de la période de vingt années mentionnée dans l'Article précédent, ou si, à toute époque, les Compagnies, sans un motif jugé valable par les Gouvernements respectifs, la Commission Internationale entendue, cessent, pendant une période de six mois, d'exploiter le Chemin de Fer Sous-marin, conformément aux règles prescrites par ces Gouvernements ; alors, et dans un quel-conque de ces cas, celle des Compagnies qui aura été en faute encourra la déchéance, et il sera procédé à cette déchéance suivant la législation en vigueur à ce moment dans chaque pays.

La déchéance ne pourra être prononcée par un Gouvernement contre une Compagnie, que lorsque la nécessité de cette mesure aura été reconnue d'un commun accord par les deux Gouvernements, sur l'avis de la Commission Internationale.

11. Chaque Compagnie pourra, à toute époque, durant l'exécution des travaux, renoncer au bénéfice de la concession, dans le cas où l'impossibilité de continuer les dits travaux serait dûment constatée par le Gouvernement dont elle relève.

Dans ce cas, la déchéance sera prononcée, et il sera procédé conformément aux stipulations de la Loi de Concession Française ou de l'Acte du Parlement Britannique.

12. A toute époque après la trentième année à partir de la mise en exploitation du Chemin de Fer Sous-marin, chaque Gouvernement aura le droit de racheter l'entreprise de la Compagnie établie sur son territoire. Toutefois ce droit ne pourra être exercé que d'un commun accord entre les deux Gouvernements, et après un avis donné par écrit aux Compagnies six mois pleins d'avance. En cas de rachat, le droit de chaque Gouvernement sur le sol, les travaux, et l'entreprise, sera limité à ce qui existera sur son propre territoire, comme il est défini à l'Article 1.

13. The amount of the purchase-money in each country shall be determined as follows, under the supervision of the International Commission:—The net receipts of the Company during the seven years immediately preceding the year in which the purchase is effected shall be ascertained; the two years of minimum receipts shall be excluded, and the mean of the annual net receipts during the other five years shall be taken. That mean net receipt will form the amount of an annuity to be payable to the Company for the unexpired term of the concession, or, at the option of the British Government, for the purchase of the English concession, the basis of the calculation of a capital sum representing the value of the annuity at the time of purchase. In any case the amount of the annuity to be so payable, or which is to form the basis of such calculation as aforesaid, is not to be less than the amount of the net receipts during the year immediately preceding the year of purchase.

Each Government is to provide and pay the annuity or capital sum which will be due to the Company established on its territory.

The Company shall receive in addition the payments to which they may be entitled at the date fixed for the expiration of the concession in accordance with paragraph 4 of Article 8.

14. The working and maintenance of the Submarine Railway after either the purchase or the termination, or the forfeiture, of the concession in either country, shall be provided for by a Supplementary Convention then to be made between the two Governments.

15. Each Government shall have the right to suspend the working of the Submarine Railway and the passage through the Tunnel whenever such Government shall, in the interest of its own country, think necessary to do so. And each Government shall have power, to be exercised if and when such Government may deem it necessary, to damage or destroy the works of the Tunnel or Submarine Railway, or any part of them, in the territory of such Government, and also to flood the Tunnel with water. If any of the powers of this Article are exercised by either of the Governments, then and in every such case neither the other Government nor either of the Companies shall have any claim to any other indemnity or compensation than the following: If any such power is exercised during the term and currency of the concession to either Company, the period of concession to such Company is to be extended for a term equal to that during which the working of the Submarine Railway has been suspended in consequence of the exercise of any of the powers mentioned in this Article. If any such power is exercised before the expiration of the period during which the French Government has engaged not to grant any rival concession, the term of this period shall be extended in like manner as that of the concession.

Each Government, however, reserves to itself the right, if it should think fit, to grant to the Company

13. Le prix de rachat dans chaque pays sera déterminé de la manière suivante, sous le contrôle de la Commission Internationale: On relèvera les recettes nettes obtenues par chaque Compagnie pendant les sept années qui auront précédé celle où le rachat sera effectué; on en déduira les produits nets des deux plus faibles années, et l'on établira le produit net moyen des cinq autres années. Ce produit net moyen formera le montant d'une annuité qui sera payée à la Compagnie pendant chacune des années restant à courir sur la durée de la concession; ou, au choix du Gouvernement Anglais, pour le rachat de la concession Anglaise, ce produit moyen formera la base du calcul d'un capital représentant la valeur de la dite annuité au moment du rachat. En aucun cas, le montant de l'annuité ainsi payable ou devant former la base du calcul ci-dessus indiqué, ne devra être inférieur au montant des produits nets de l'année qui aura précédé immédiatement celle du rachat.

Chaque Gouvernement devra pourvoir au payement de l'annuité qui sera due à la Compagnie établie sur son territoire.

La Compagnie recevra, en outre, les remboursements auxquels elle aurait droit à l'époque fixée pour l'expiration de la concession, selon le paragraphe 4 de l'Article 8.

14. Lors du rachat, d: l'expiration ou de la déchéance de la concession dans chaque pays, l'exploitation et l'entretien du Chemin de Fer Sous-marin seront assurés par une Convention Supplémentaire à intervenir entre les deux Gouvernements.

15. Chaque Gouvernement aura le droit de suspendre l'exploitation du Chemin de Fer Sous-marin et le passage à travers le Tunnel, quand il jugera convenable de le faire dans l'intérêt de son propre pays. Chaque Gouvernement aura aussi le droit pour l'exercer quand il le jugera nécessaire, d'endommager ou de détruire en totalité ou en partie les travaux du Tunnel ou du Chemin de Fer Sous-marin sur son propre territoire, comme aussi de noyer le Tunnel. Dans le cas de la mise à exécution par l'un des Gouvernements de l'un des droits mentionnés dans le présent Article, l'autre Gouvernement et aucune des deux Compagnies ne pourront prétendre à d'autre indemnité ou compensation que la suivante: Si le droit susdit est exercé durant la période de concession faite à l'une des deux Compagnies, le terme de la concession faite à cette Compagnie sera prorogé d'une période égale à celle pendant laquelle l'exploitation du Chemin de Fer Sous-marin aura été suspendue en conséquence de l'exercice de l'un quelconque des droits mentionnés dans cet Article. Si le même droit est exercé avant l'expiration de la période pendant laquelle de Gouvernement Français s'est engagé à n'accorder aucune concession concurrente, le terme de cette période sera prorogé comme celui de la concession.

Chaque Gouvernement se réserve d'ailleurs le droit d'accorder, s'il le juge à propos, à la Compagnie établie

established in its own country, but not to the Company established in the other country, such compensation for damage actually done by its order to the works of each Company as such Government may in its discretion think proper.

16. Works for purposes of defence, and such other works as may be required by either Government, shall be executed by each Company in accordance with the laws for the time being in force in the country where such Company is established.

17. It is understood, as regards the use of the Submarine Railway, that equal facilities shall be afforded in the formation of trains, in the running of carriages and waggons, and in the transport of passengers, animals, and goods of every description, whatever may be the points of departure or of destination, and whatever may be the routes followed.

18. The provisions of the Treaty to be concluded shall not come into force before they have been sanctioned by the Legislatures of the two countries.

C. K. A. DE L.
H. W. T. CH. G.
H. W. C. M. K.

True copy.

H. AUSTIN LEE.
H. DE LAFAULOTTE.

dans son pays, mais non à la Compagnie établie dans l'autre pays, les compensations qui lui sembleront convenables pour les dommages causés par son ordre aux travaux de cette Compagnie.

16. Les travaux défensifs ou autres demandés par l'un des deux Gouvernements seront exécutés par les Compagnies respectives, en conformité des lois existant dans chaque pays à l'époque de leur exécution.

17. Il est entendu, en ce qui concerne le service du Chemin de Fer Sous-marin, que les mêmes facilités seront accordées, soit dans la formation des trains, soit pour la circulation des voitures et des wagons, soit pour le transport des voyageurs, des animaux et des marchandises de toute nature, quels que soient les points de départ ou de destination et quelles que soient les routes suivies.

18. Les dispositions du Traité à conclure n'entreront en vigueur qu'après qu'elles auront été sanctionnés par les Législatures respectives des deux pays.

C. M. K. H. W. T.
CH. G. H. W.
A. DE L. C. K.

Pour copie conforme.

H. DE LAFAULOTTE.
H. AUSTIN LEE.

THE CHANNEL TUNNEL.

Memorandum by Sir GARNET WOLSELEY, G.C.B., G.C.M.G.

[PRESENTED TO THE JOINT SELECT COMMITTEE, 1883.]

Two "private bills to legalize the construction of a tunnel between Dover and Calais are to be laid before Parliament during this coming Session. They have reference to two rival schemes, into the relative merits of which I need not enter. I propose merely to discuss the general question of the propriety of making any such tunnel at all, as this is the point of real importance to the nation.

The proposal to make a tunnel under the Channel may, I think, be fairly described as a measure intended to annihilate all the advantages we have hitherto enjoyed from the existence of the "silver streak," for to join England to the Continent by a permanent highway will be to place her under the unfortunate condition of having neighbours possessing great standing armies, a state of things which prevents any of the Continental Nations from disarming as long as any one of them refuses to follow suit. The construction of the tunnel would place us under those same conditions that have forced the Powers of Europe to submit to universal service. It is to be hoped, therefore, that these measures may not be treated simply as "private bills," but that the question may be dealt with as one of great national importance.

The promoters of this tunnel must be called upon to publicly defend a proposal which, on the face of it, threatens us with a most serious public danger, but up to the present no discussion on the subject has taken place at all. I do not believe the people at large are aware they have any grave interests in the tunnel, or that its construction involves anything more serious than whether or not those who travel to and fro between England and France shall or shall not be saved from a little sea-sickness.

Whatever may be the right decision to be arrived at in the matter, this view is certainly a false one; and I propose to show cause why the whole subject should at least be discussed in the gravest and most exhaustive manner before any Bill on the subject is permitted to become law.

I do not think there is a naval or military man of any experience who does not consider that the construction of a submarine tunnel between England and France would introduce a new element of danger into the problem involved in the defence of England from invasion, although some may differ as to the extent of that danger. There may be some who will say, "You can effectually counteract this danger, protect yourself against it, in fact, nullify it"; but that the tunnel does mean a new danger is virtually undisputed, and I believe that all thoughtful students of war will admit this to be the case. But whilst all will, I think, acknowledge that danger is involved in the scheme, a large number will go further, and will assert that, whatever precautions be taken, and even if it be assumed that more money is spent on fortifications than any British Cabinet is ever likely in time of peace to ask from Parliament, it will still be impossible completely to provide against the risk. You may, by a very great outlay of money in the first instance, and a considerable annual expenditure on the maintenance of fortifications and on other necessary precautions, do a great deal to mitigate the evil; but you cannot remove it altogether except by the creation of an army fully equal in every respect to that which France can put into the field, and I am sure the people of England have no intention of imposing such a fearful burden upon themselves.

Why, therefore, should Parliament sanction a scheme that tends in any degree, no matter how small, to imperil our national existence, or to entail such serious responsibilities upon us? Let the engineers and the railway speculators, who are pushing it forward, make clear to us what are the national advantages which should induce the nation so to weaken itself. The advantages must be of immense importance indeed if they are to counterbalance the least risk to our national security. It is not the nation which has demanded this great change in our position; it is not the nation which has asked to become a part of the Continent, and to cease to be "a sea-girt isle." I confess I am at a loss to understand what we are to gain, except an immunity from sea-sickness when crossing the Channel. I am aware of sea-sickness being one of the most unpleasant and most trying of human ailments, but are we deliberately to make England less safe in order that tourists may not suffer from it during the 2½ hours occupied in the Channel passage?

I am not in a position to express any opinion as to the effects the construction of the tunnel will have upon trade; but looking to the fact that, although we have railways from all our coal-fields to London, considerably more than a third of all the coal consumed here is brought by sea; and, considering the high toll which all goods sent through the tunnel would have to pay if rates are to be charged on a sufficiently remunerative scale to pay a fair interest on the money spent in this very costly undertaking, I cannot imagine that any very large proportion of the trade between England and Europe would ever go through it.

We shall, of course, hear a great deal of the inconvenience and hindrance to trade occasioned by the "breaking of bulk" in sending merchandise by sea to and from the Continent. It is obvious that, to some extent, even as a mere money question, there must be set against this the greater costliness of transport by rail through an expensive tunnel as compared with the cheap transit of goods by sea between England and the ports of France, Germany, and the Baltic. But I am not in a position to assess the actual balance in economy to whichever side it may incline. I leave these calculations to the promoters of the scheme.

Again, I do not intend to question the possibility of the work as an engineering enterprise. I feel confident that any operation of the kind undertaken by an engineer so eminent as Sir John Hawkshaw will be successfully carried through. Nor, though no one can predict to what sum the cost of the construction may finally amount, do I pretend to dispute the possibility of the subscribers receiving a dividend.

It is evident that this is a question that may be fairly raised, even if the cost does not exceed the £10,000,000 at which it is commonly estimated, but that is a point for those to consider who invest money in the scheme; it is foreign to the subject I propose to deal with here.

I have searched in vain for some clear statement from the promoters showing the advantages which, in their opinion, would accrue to England from it. What, therefore, I maintain to be absolutely necessary is that those who advocate the con-

struction of this tunnel should, in the plainest terms, specify the benefits which it will confer on England, so that the nation, having the national loss and the national gain fairly set before them, may determine on which side the balance of advantage lies.

In a pamphlet before me, the only one I have seen that professes to deal with the subject from the "promoters'" point of view, the writer studiously avoids dealing with facts or figures, and contents himself with safe generalities and high-sounding platitudes. He enlarges upon the benefits and blessings to mankind which the tunnel will secure (he confesses that "*there may be differences of opinion as to the commercial results of the enterprise*"), whilst he dismisses all consideration of the dangers it will entail upon England in the following words:—

"*To those who think our national safety can be lessened by the construction of the tunnel, which can be closed in a few minutes, I can offer no arguments which will induce them to change their opinion; I will not stop to consider their prejudices or their ignorance.*"

This oracle, who will not condescend to argue with the "ignorance" of the skilled soldiers and sailors who view the scheme with horror and undisguised alarm, is as careful not to enter into any details as to how this tunnel is "*to be closed in a few minutes*," as he is silent upon the direct benefits we are to obtain from its construction. He contents himself with telling us it will "*strengthen the bonds which unite two great powers. Give permanence to that respect and friendship between nations which forms the best and most secure basis upon which prosperity can depend*," and he enlarges upon "*the inconveniences of the sea-passage.*"

Is there any enterprise, the dream of which has ever yet entered into the minds of "projectors" or "promoters of companies" no matter how wild or unnational, that could not be equally well puffed and recommended to those who have money to invest?

I am glad it is admitted that "*there may be differences of opinion as to the commercial results of the enterprise*"; this may make some at least hesitate before embarking their money in it, and may give the nation at large time to reflect before they consent to a scheme which, whether it does or does not *pay*, is, as I firmly believe, fraught with great danger to our national existence.

We are told "*the interest taken in the subject in France is greater than in England*," and it is very natural it should be so. A nation that can place an army of three-quarters of a million of drilled and disciplined soldiers in the field has nothing to fear on the score of invasion from us, whose army is insignificant in comparison with theirs. It is the fact of France having this great highly-trained army, whilst we could not, even in England itself at this moment, place an efficient army in the field of two army-corps (about 60,000 men) of regular troops, although all our army reserve had rejoined the Colours, that shows the absurdity of men saying, when discussing this question, "Why should we not seize the Calais mouth of the tunnel in the event of war or of its being threatened?" There is no reason why we should not do so by a *coup de main* or by treachery, but having done so with a few thousand men, and assuming we then poured all this army of ours through the tunnel, how could we with 60,000 men hope to make front against the hundreds of thousands that would be hurled against us, or what object could we have in attempting this forlorn hope? We could not hope to conquer France, or even to capture the strongly fortified city of Paris, with such an army. In addition to this fact, which very naturally weighs much with the rulers of France, it is well known that at this moment there is a craze in Paris for all sorts of financial speculations, and companies started for the promotion of railways or banks, &c., in Tunis, Tripoli, or in fact in any foreign country, are certain to obtain there great financial support.

The railway company "Du Nord" has the complete monopoly of the carrying trade in the departments of France opposite Dover, so the construction of this tunnel would naturally be a great gain to it; the powerful influence which this particular company exercises is therefore all given in favour of the scheme. We are told that this scheme has also met with the support of powerful financial houses. I do not doubt it, but surely it is the business of nations and of statesmen to look on their own account at the political bearings of all such questions, although the financial houses may fairly claim to deal with them on financial grounds unhampered by political or patriotic considerations.

Let us pause for a moment to consider how it comes about that, whilst all the great and would-be-great Continental Powers are bowed down by the weight of military burdens, we have hitherto lived in safety and grown rich, though the army we maintain at home is so small as it is. How is it that we have not had to submit to the law of universal military service, nor to conscription in any form? What is it that has saved us from foreign invasion so long? There can be but one answer, it is our "silver streak." A railway company now asks permission to make an easy way through that guardian girdle to which we owe so much.

The Duke of Wellington, by his now historical correspondence with Sir John Burgoyne, roused the nation to a sense of its helpless condition and its powerlessness to resist a formidable invasion. The Militia Bill and the fortification of our great dockyards and arsenals were the results.

In his letters he said that England had been lately joined to the continent of Europe by "*an isthmus of steam*," and that consequently the military and naval value of the wet ditch which formed our great natural line of defence was no longer what it was in the days of sailing ships. In the time when he wrote, the standing armies of Europe were small in comparison with those of to-day. Were he now able to speak, what would he say if it were proposed to connect England with France by a permanent and almost indestructible "isthmus" when all the Continent bristles with bayonets, and the first desire of every Continental Power is to be strong on land and to keep the great military machine, its army, in a state of perfection and complete readiness for active operations upon the shortest notice? The "isthmus of steam" that he dreaded was still a floating one, subject to a hundred interruptions from storms and fogs that rendered it temporarily useless, but it is now proposed to burrow this tunnel some 200 feet beneath the surface of the ground. It will, in fact, be, if made, more indestructible than any other possible form of roadway, and the possession of it by a Continental enemy for 24 hours would place this country completely at his mercy. Those who know Wellington's power of thought, the soundness of his military judgment, his clearness of perception upon such questions, will not require to be told what his advice would now be upon this question, which I believe, may influence if not decide the fate of England.

The adoption of steam as a motive-power for vessels revolutionized the condition of all questions bearing upon invasion, and was therefore at the time, as pointed out by the Duke of Wellington, a subject of very great importance to us. But if it added to our dangers, it also—certainly in a lesser degree—increased our means of defence, especially when the invention of the electric telegraph is taken in conjunction with it. This question of the construction of the tunnel brings with it, however, nothing but danger. Steam may have been the first great step towards the destruction of our former naval supremacy, and in that way its effect may have hurt us, but, whatever advantage it conferred upon others, it conferred similar benefits upon us; but this is not so with the tunnel, for it will open out a road for the invader into England along which we have no army with which we could, under any circumstances, pass over to the Continent.

No question of such vital importance has ever before come up for the serious consideration of the nation; and I would urge my countrymen, with all the earnestness I can convey in words, to deal with it in the most serious manner, not allowing themselves to be carried away by the careless words of speculators, who, having a bad case, adopt the threadbare trick of abusing their opponent's attorney, in the hope of blinding the jury to the point which is really at issue.

There is not, in my opinion, any real analogy between the considerations involved in the construction of a tunnel under the Alps and of one under the English Channel. In the former case great highways between the countries on each side of those mountains have long existed, and over them armies have often crossed already, and could again do so at any time. No roads, however, unite England to the Continent. A great wet ditch over 20 miles wide at its narrowest point, surrounds our island, the navigation of which, except in the calmest weather, would be no easy matter for any large flotilla. Soldiers, who know the value of an ordinary wet ditch to any fortified place, are fully alive to the enormously great security which a ditch like the Channel affords. If any great Continental Power had a similar wet ditch protecting its frontier, I think we may safely assume it would never forego that advantage, in fact, cast it recklessly away, by allowing it to be tunnelled under. And yet a great military Power would have little to dread under the circumstances in comparison with the risks a tunnel must entail upon us. With them all laws and commercial regulations are primarily based on military considerations, with us military considerations come last. To these great Powers the construction of a new high road over a mountain frontier would be of more consequence than the digging of a tunnel under it. To guard the tunnel would be a simple operation to a nation possessing an immense standing army; indeed, it may be safely asserted, that no tunnel under the mountain frontiers of great nations will ever be of any use to the invader, for, even if by a *coup de main* or by treachery he managed to seize the far end of the tunnel, he would have to fight a pitched battle there with an army of at least equal strength to his, and to do so in a position where defeat or even want of success would be his destruction. The great military Powers do not base their security upon plans designed for the defence of their frontiers or with a view to making them impassable to an enemy, but upon the conviction that they themselves have an army of sufficient strength and worth to meet the army of all or any comers in the open field. They do not depend upon frontier fortifications, but upon highly efficient armies, ready at all times to take the field upon the shortest notice, upon armies in which, I may say, the whole male population is comprised, all thoroughly organized as a great machine whenever the directing power pulls the lever that is to put it "in gear" and into motion.

Of course, wherever nature has been kind enough to bless them with great natural barriers in the form of mountains or rivers, they are wise enough to utilize those defences and to strengthen them by art; but as a rule it may be said that one and all of them could to-morrow invade their neighbour's territories notwithstanding these defences, should they consider it expedient to do so. No nation has as yet ever been able to render its frontiers inviolable by means of fortifications, although, according to the natural features of those frontiers, it may be, or has been possible, by means of fortifications to make the would-be invader pause before he resolved upon incurring the risk involved in running his head against the strong places with which those frontiers bristled. The Rhine, and the fortifications along the eastern frontier of France did not save her from invasion in 1814, 1815, and 1870, although had her army been at all equal in numbers to the invading forces, their value would have been priceless. France now feels that her only safety is in having an army in every way equal to that which her possible invaders can bring into the field. With such a force, organized so that its mobilization can be effected in a small number of days, she can afford to have a tunnel under the Alps. Her strength is in her army, but the strength of England lies in the protection which her insular position secures to her. If we had a great standing army like that of France; if the whole manhood of England was organized into regiments, and so into a great military machine, complete in every part, and always ready to take the field, we could afford to create this new danger to our national existence. If we felt that, were France to pour her hundreds of thousands of soldiers into this country, we could meet her armies with others equally powerful, we might make up our minds to running the risk of staking our all upon the result of battle, although, in my opinion, it would be very foolish to do so, without we had some great national object and advantage in view; but, when we know that we have no such army, and never can have it under our form of government, when we know that were a hostile army of 150,000 men to be landed here or come through the tunnel, that London would be at its mercy, as we could bring no army into the field that would have the remotest chance of resisting its advance, I think that most reasonable men will admit there is no analogy between tunnelling under the Alps, and tunnelling under the Channel. The construction of new roads across the frontiers of continental states concerns them little, partly because those frontiers are mostly open and are already traversed by numerous highways, but chiefly because it is to the power of their armies, and not to the strength of their frontiers that they look for security. The existence of the Channel has hitherto saved us from the fearful burdens which an army raised upon the principle of universal service imposes, but when that Channel is bridged we shall either have to follow the example of the continental nations in their military establishments, or to content ourselves with depending for our safety upon the forbearance of the power that, for the time, may hold the Calais end of the tunnel.

Is this the position to which a great people should submit?

In talking once to an officer upon the subject of some important changes it was proposed to introduce into India, he said: "We are such fools in matters of this sort that it is possible we may consent to these proposals, but one thing is certain, if carried out, they will lead to another mutiny, and that will be a good thing for us soldiers." I may, in some respects, say the same regarding this tunnel, for the first scare that overtakes us as a nation (and we have had some scares in my time already) the nation, realizing for the time, at least, its helpless condition, will rush into large additions to its army. As I have already said, the construction of this tunnel means most certainly an immediate large increase in military expenditure, both for the construction and armament of new fortifications, and sooner or later for the creation of a much larger army than that now maintained at home. Were the matter laid before the friend to whom I have just referred, he would doubtless say, with a sigh, "Well, ruinous as the construction of this tunnel may be to the nation, it will at any rate be a great thing for the army." This is, however, poor consolation for the patriot, although he may be a soldier.

The promoters of this scheme love to dwell upon the miseries of sea-sickness, and in doing so they appeal to the feelings of a very large section of those who annually cross the Channel; but although they are quite pathetic over the horrors suffered at sea by tourists, they are silent upon the crimes, the sin, the murders, and the sufferings which are the inevitable results of an invasion. It is a subject that should be brought home to every man, woman and child in the three Kingdoms. Those who do not know what "an invasion" means should study de Segur's or de Fezensoc's narrative of the invasion of Russia, Erkman-Chatrain's stories of the Napoleonic wars, or the accounts given to us recently by our newspaper correspondents

of the miseries and the heart-rending events which attended upon the German invasion of France. Every invasion means sorrow, suffering, and degradation to the invaded; it means dishonoured women, and murdered old parents, the sack of towns, the destruction of homesteads, no matter how well organized and humane may be the invader's army.

A German having been asked lately by an Englishman why it was that his countrymen went on yearly drilling hundreds of thousands of men, who might be so much more usefully and profitably employed, replied: "You English, with your great wet ditch round you, know nothing of the horrors of invasion; we are well acquainted with them, and having no natural line of defence, like the seas which encompass your shores to protect us from attack, we infinitely prefer submitting even to the tyranny of our military system, to the immeasurable burden of universal service in the army, rather than run the risk of finding an army over-running our country, and having to undergo the sorrow, the pain, and the public and private humiliation which that would mean; of two evils we choose that which is a fleabite compared to the killing poison of the cobra." He went on to say that we English did not understand or appreciate how much we owed to our "silver streak."

This conversation took place before the project of the tunnel had assumed the alarming proportions it now has; but what would that German have said if my friend had calmly told him, "We intend to bridge over that 'silver streak' as soon as our possible enemies, the French, will raise the necessary funds for doing so. We believe in moral force, and we do not for one moment contemplate the possibility of any Continental Government being criminal enough to have any wish to invade England."

"Those whom the gods wish to destroy, they first drive mad," would certainly have been the German's instant thought.

I have heard it stated that this tunnel can be neutralized—held sacred—under a convention to be entered into with France and other Continental powers, and that it is ridiculous to imagine that any civilized power would ever, under any circumstances, disregard the terms of such an agreement. If this proposition were left to the common-sense of the country, after a thoughtful consideration of what all the previous experience of mankind on the subject has been, I should have no fear as to the verdict. Unfortunately, as has been fully acknowledged by one of the most prominent advocates of the scheme, Englishmen, for the most part, do not face the facts of the situation at all.

Their wet ditch has so completely saved them from the necessity of contemplating the danger of war that they never do consider it at all, and they do not study the experiences of other countries, or apply them to themselves. They do not realise that the question now is, whether the very cause which has saved them from the necessity of taking into account the possibility of war shall or shall not be removed. Let me, therefore, entreat them for a moment, to place themselves in the position they are so willingly going to assume, of a country which has to face the possibility of an invasion, provided only its enemies choose to invade it. Let them, then, realise that the thing on which they propose to stake their natural existence is the character of the man who may at any time hereafter have the means of wielding the power of France. Is human nature so utterly changed that it has become certain that what has been may never be again?

What is the nature of the treaty that a man of the great Napoleon's turn of mind and morality would respect or care anything for the moment he felt that the interests of his nation would be advanced by breaking it? Did the most solemn treaties save Genoa or Venice from his sword? What guarantee have we that another Napoleon may not again direct the destinies of France; and, supposing he did appear, should we know his intentions before he struck his blow? What did Frederick the Great care for such treaties? Did they save Austria from his rapacity, and from his greed for extended territory? Where, in the history of the world, from the earliest time down to the years when Khiva was made Russian, or when Tunis was added to the African possessions of France, do we hear of treaties being respected by the nation who had an interest in breaking them, and who felt itself strong enough to do so?

It is no new theory, it is the experience of all ages, that the nation which depends for its safety, for its independent existence, upon paper treaties, unsupported by the actual strength that would always enable it to enforce compliance with them, rather than upon that strength itself, is far down on the decline that leads to national ruin. But yet another danger lurks in the manner in which this question is brought before us. The road to our ruin is paved with what look like good intentions. Just as at the end of the last century the way to the conquest of Switzerland, Germany, and Italy was prepared by the specious cry of universal brotherhood, so now, we are told that we may, with a light heart, increase our wealth and our personal comfort, though we sacrifice our country to our selfish indulgence, and may all the time think that we are most virtuous people for our pains, for is it not all done under the plea of mutual trust and mutual confidence between nations.

I am discussing a practical problem, and it is not my function to deal with questions of morality, not that I by any means despise them. But I may venture to recall the fact that those whom the nation has in times past trusted on such subjects have spoken out in quite a different view. Hear this:—

"'Tis well! from this day forward we shall know,
That in ourselves our safety must be sought,
That by our own right hands it must be wrought,
That we must stand unpropped, or be laid low."

What would any of those who have thus spoken, or those who have told us that—

"No little German State are we,
But the one Free Voice in Europe we must speak."

"It was our ancient privilege, my Lords,
To fling whate'er we felt, not fearing, into words."

What, I say, would men think hereafter of the moral grandeur of our position if we are to be told that we must never again denounce some foreign crime in bold words, lest, perchance, the criminal should turn his power against us, and punish us by a sudden act of treachery for such a breach of the principle of universal brotherhood?

The nation that would shirk the responsibilities of independent national existence, and would hide its want of manhood and its patriotism under these pretty words, deserves to exist, and will exist, no longer than the moment at which its theoretical security is touched by the rough practical hand of the enemy, who will laugh at the cries against "breach of faith" when the "confidence trick" ends in the way it always has ended, in the robbery of the deluded victim.

No one can have a higher appreciation of the Volunteer Force than I have, and were invasion threatened, I am confident its numbers would soon swell to double its present strength; but it is not organized for war, nor in a condition to take the field to resist the advance upon London of a large regular army. There is sprung up in some quarters an idea that the defence of the country can be safely left to our Volunteers and Militia; a doctrine more dangerous to England it is difficult to imagine. Those forces would be excellent adjuncts to an army in the field, if we were allowed by our enemy time to organize them; but to depend upon them as our main fighting body could only end in disaster.

In these days of railways, time is no longer on the side of defence when the frontiers of a State march with those of a great military power, whose army is organized for rapid mobilization; but as long as the "silver streak" remains unbroken, our frontiers are not conterminous with those of any

foreign nation, and we can always count upon at least a month in which to make our preparations; and our fleet, although it may not be as numerous as that collected in the Channel by our enemy, will still be able to play a great part in our defence. Let these shores be joined to those of France by a sub-way which our fleet cannot touch, and we are at once deprived of the assistance of our ships, on which we have hitherto mainly relied for their defence. Whenever a great general like Wellington, or a soldier like Burgoyne, endeavoured to arouse the nation to a sense of its military weakness, and urged upon it the necessity of increasing our standing army, they have always been met by reference to the glorious days of Nelson, and to the superiority of our navy over that of all other nations.

We were asked how could any nation invade us whilst our fleets kept the seas? and where was the nation strong enough to dispute our possession of them? With the construction of this proposed tunnel another answer must be framed to calm the minds of those who may become alarmed by the note of warning sounded by the men who are most deeply versed in all that refers to the defence of our island home. The alleged power of our fleet can no longer be flaunted before us the cry must then be the ease with which the tunnel could be destroyed. A tunnel under the sea carries with it naturally the idea that to flood it, and thereby render it useless, would be the simplest of operations. But is this the fact? I have not yet seen any plan worked out which would secure us the power of flooding this projected tunnel in moments of danger, although I am told there are dozens of methods by means of which it could be effected, or the tunnel otherwise rendered impassable. The fable tells us that the fox that had dozens of plans always ready for securing his safety, forgot them all when he found himself in the face of dangers, and fell an easy victim to his pursuers in consequence.

I assume that even the calmest of philosophical projectors will admit that it is essential we should make every preparation for the destruction of the tunnel, even although they may believe that war on earth is at an end.

To secure to us the power of flooding this tunnel at any and every moment, to have everything at all times in working order for doing so, is by no means so simple or so easy as it would seem.

I very much doubt the possibility of making certain of being able to flood the tunnel by the explosion of a mine in the tunnel itself. The tunnel is to have, I understand, a depth of about 200 feet beneath the bottom of the sea. With what sort of a mine or mines is it proposed to blow an opening from the tunnel into the sea, through that amount of rock or densely compressed chalk, and how is such a mine to be tamped? Are these mines to be kept always charged? If so, will it not be regarded by those who are so tender towards the feelings of all foreign nations as insulting to our neighbours beyond the Channel? Will it not be said to weaken or risk the destruction of that *entente cordiale* upon which so much value is set? May not the existence of such mines with the galvanic wires and contrivances for their ignition, always supplied and ready for use, increase the terrors of the underground passage to the timid ones who now suffer so severely from sea-sickness, if it did not affect the rate of insurance upon all merchandise passing through it?

It requires no prophetic gift to foretell that before long considerable pressure would be brought to bear upon the Government of the day for the withdrawal of these mines, which, we should be told, hurt the susceptibilities of our foreign friends, by marking our distrust of their good faith, their love for peace, etc., etc.; and if one Government can be found to sanction the construction of the tunnel itself, there is no reason why another should not by-and-by entail the additional risk to the nation of "drawing the charges" from the mines designed for its destruction in case of need. Many specious arguments would be forthcoming in favour of this being done, and being as a people curiously credulous as to the good faith of foreign nations, learning nothing even from all recent experience on this point, as we are a good easy-going community, sincerely devoted to peace ourselves, and unable to understand how any other power can reason differently from us on the subject of war, we should, I I think, be certain, sooner or later, to remove these mines.

But even supposing we did not, what certainty can we have that the mines will explode when required; a galvanic battery is easily put out of order; something may be wrong with it just when it is required, or the force it sends along the wires may not be sufficient to ignite the charge. I have seen this occur many a time with small charges, and it is quite as possible with very large ones. Then the gunpowder may be damp, the dynamite or the guncotton accidentally so weak that the explosion does not effect the intended object. A hundred accidents might occur to the very best contrived system of mines having this object in view, even although you multiplied the number of your batteries and the number and size of your mines. The arrangements made for destroying the tunnel would be soon known to the headquarter staff of every great military power, and it would be impossible for us ever to keep secret the position of the mines or of the wires intended to ignite them. The enemy intending by a *coup de main* to secure the forts guarding our end of the tunnel, could easily seize at the same time the wires, batteries, etc.

By the fact of its being admitted that mines for the destruction of the tunnel would be necessary in the event of its being made, it is evident that danger to England is involved in this question. To protect us from this danger, are we to content ourselves with schemes which depend entirely upon the nice working of galvanic batteries or of sluice gates, the secrets of which are bound to be known to the enemy?

Assuming, however, that it is deemed possible to flood the tunnel by an explosion to admit the sea, I presume no one would recommend us to depend alone upon such an uncertain means of defence. Arrangements would, I am sure, be also made for flooding it by sluice-gates contrived to admit the sea through great drains, the mouths of which would be well below the low-water level. Might not even these water conduits become choked or unserviceable when required; or, where the stake at issue is so colossal, the greatest any power has ever played for—namely, the possession of England—might not these drains be rendered useless by treachery just at the moment they were required for use? To risk our national existence on the strength of plans for flooding the tunnel, when we are not called upon to run the risk for any great national object, would be suicidal folly, no matter from what point of view the question be examined.

But the greatest of all dangers to which the construction of this tunnel will lay us open, is that our end of it may be seized by surprise or treachery, without any warning, and before the machinery designed for its destruction had been put in motion. In considering this point, we can afford to assume, for the sake of argument, that all appliances for blowing up the 200 feet of chalk intervening between the tunnel and the bottom of the sea, and so effectually flooding it, and that all arrangements for flooding the tunnel from our end by opening sluice gates, etc., etc., are all in perfect order, and would, if made use of, be completely effectual. The nation in possession of the Calais end of the tunnel, in order to become the masters of England, has, nevertheless, only to land during the night a few thousand picked infantry at Dover, or to send them through the tunnel itself, to seize our end and the works intended for its protection, and so, by this *coup de main*, or by treachery, possess himself of the wires for firing your mines, and the apparatus for flooding it from the sea. This would be a very feasible operation, especially in calm weather. In an hour's time from the moment when our end of the tunnel was taken possession of by the enemy, large

reinforcements could reach Dover by rail through the tunnel, and, as there are to be two lines of rail, before morning dawned Dover might easily be in possession of 20,000 of the enemy, and every succeeding hour would add to that number. Dover held by an enemy in possession of the tunnel would place England at his mercy. Our fleet could do nothing to help us, and we have no army under present circumstances, nor are we ever likely to have an army capable of resisting the military strength of any of the great Continental Powers. It is essential that this fact, and fact it certainly is, should be known and realized by the nation. The flattering theory, imbibed in childhood from the history of Cressy, Poictiers, Agincourt, and of many more recent battles, that one Englishman is equal to any five foreigners, is doubtless very gratifying to the national vanity, but it is almost needless to say that our traditional valour does not, in these days of rifled arms, give us the advantages we formerly possessed over continental nations. There can be no doubt of the fact that whenever an enemy's army of about 150,000 trained soldiers is able to march on London, England will for ever afterwards cease to be a great nation.

The construction of a splendid harbour at Boulogne, designed to admit the largest class of warships, is now being pushed forward rapidly. Great harbour works are also in progress at Calais and at other French ports on the Channel. These works would enable a large army to be embarked there at any time of tide, and would afford a safe anchorage for the two or three steamers that would be required for the conveyance of the few thousand infantry intended for the sudden descent upon our end of the tunnel. The construction of these great harbours, so close to our open and unprotected shores should, I think, cause us to review our military position at home very seriously, and to make us pause ere we discarded the only real armour we possess, namely, the protection which the "silver streak" has hitherto afforded us.

The greatest of all generals believed in the possibility of successfully invading England under certain conditions, and the Duke of Wellington was also of that opinion. I have, however, no intention of discussing here this much vexed question; to do so would be foreign to the subject I am dealing with, namely, the dangers which the construction of the Channel Tunnel would entail upon our country.

There is a vast difference between the "invasion of England," as that operation is generally understood, and the mere landing of a few thousand infantry in or close to Dover Harbour, for the purpose of seizing by surprise our end of the tunnel. The former means the disembarkation of an army of 150,000 men, fully equipped, with guns, cavalry, and military material of every kind, and would be a very difficult operation, even under the most favourable circumstances; but the latter is merely the small affair of a dashing partisan leader, and could be effected in many ways.

The contention that the tunnel could only be of use to an enemy who had already successfully invaded England is unsound, unless, indeed, it be contended that this *coup de main* of a handful of infantry must be regarded in that light. However, be this as it may, it must be remembered that the works at our end of the tunnel may be surprised by men sent through the tunnel itself, without landing a man upon our shores. A couple of thousand armed men might easily come through the tunnel in a train at night, avoiding all suspicion by being dressed as ordinary passengers, and the first thing we should know of it would be by finding the fort at our end of the tunnel, together with its telegraph office, and all the electrical arrangements, wires, batteries, etc., intended for the destruction of the tunnel, in the hands of an enemy. We know that trains are often despatched along the underground railways at intervals of 2½ minutes, and those best entitled to express an opinion on the subject say that trains could be safely sent through the tunnel every five minutes, and do the entire distance from the station at Calais to that at Dover in less than half an hour. Twenty thousand infantry could thus be easily despatched in 20 trains, and allowing not 2½ minutes but 12 minutes interval between each train, that force could be poured into Dover in four hours from the moment when the first detachment had surprised the station at our end of the tunnel. Of course no man in his senses would attempt to march or send troops through the tunnel if he knew that even 100 riflemen were on the *qui vive*, waiting to receive them at the far end. But since the day when David secured an entrance by surprise or treachery into Jerusalem through a tunnel under its walls, how often have places similarly fallen? and, I may add, will again similarly fall? The general who had by ruse, or by force, or by surprise, contrived to make himself master of our end of the tunnel would feel he had behind him the best of all possible lines of communication.

The invasion of England could not be attempted by 5,000 men, but half that number, ably led by a daring, dashing young commander, might, I feel, some dark night, easily make themselves masters of the works at our end of the tunnel, and then England would be at the mercy of the invader. This is no wild dream of an impossible undertaking; few wars occur in which more hazardous, and, I may add, more difficult, enterprises are not attempted, and often succeed from their very boldness.

Are we to incur this risk on an assurance from the Government of France that such an attempt will never be made? Is the stability of that Government so assured, or the policy of the French nation so constant that we can afford to risk our existence upon such a guarantee? And why should we do so? These are questions that every lover of his country should put to himself before Parliamentary sanction is given to the construction of the tunnel.

This operation of seizing by surprise or by means of treachery the works intended for the defence of our end of the tunnel would involve no great risk upon the nation attempting it, for even if it failed it would only entail the loss of a few thousand men. Remembering the stakes to be won in case of success, it is quite certain that sooner or later the attempt would be made. The existence of the tunnel would, therefore, I contend, be a constant inducement to the unscrupulous foreigner to make war upon us, as it would hold out to him hopes of a conquest the like of which the world had never known before. With such a bait at the end of the tunnel always dangling before the foreign ruler who was anxious to strengthen his own position or to immortalize his name, and the knowledge of how little he would risk by the attempt, it is scarcely begging the question too much to say that it would be made at some period or other.

Let us assume that our arrangements for letting in the sea are in perfect order, and well conceived, still it must be remembered that unless the tunnel itself had also been destroyed by great mines so as to admit the sea from above through the crater they had formed, there is no reason why the water should not be pumped out of it if an invader had secured possession of our end of it, an operation which, effectually accomplished, would give him the best line of communication with the Continent, namely, a double line of railway, proof against all attack. Under every aspect of the question the existence of this tunnel would, I think, be an item which the would-be invader would write down as an element in his favour when making his calculations for the conquest of England, even if he despaired of being able to use it as the direct road for the advance of his troops in the first instance.

When military men have hitherto endeavoured to demonstrate the feasibility of invasion, their opponents have replied, "how is a large invading army to be supplied with provisions and munitions of war when cut off by the Channel from its base of supply?" If the invaders should succeed in eluding or in "destroying our fleet, how can they maintain their communica

tion with the Continent, open as it would be to the attack of one or two of our cruisers?" There is much sense in this line of argument, but the day that England and France are joined together by a tunnel, it will apply no longer, as through that tunnel the largest invading army could be kept supplied in safety with everything it required. In all the many discussions that have taken place on the vexed question of invasion, although divers opinions have been expressed as to the possibility of landing on our shores an army of sufficient magnitude to capture London, no sane man has ever held it would be impossible in calm weather to suddenly land a few thousand infantry upon almost any point selected for their disembarkation. The main argument against the construction of the tunnel is based upon this fact, for it is felt that our end of the tunnel could be thus seized, and that its seizure would place England at the mercy of the invading army that could then be passed through it.

I contend, therefore, that, although you may be able to render the tunnel temporarily useless by flooding it or blowing in its sides, that its existence would encourage the adventurous invader. If it be made, the continental enemy will feel that the possession of Dover as a *tete de pont* would give him possession of England.

Suppose England to have been successfully invaded, and London to be in the enemy's possession, is it not probable that, in addition to the crushing indemnity that would be exacted from us, the terms of peace would include a stipulation for the permanent occupation of our end of the tunnel, and a guarantee that our army should never be increased beyond its present modest proportions? Metz and Strasbourg were exacted from France in 1871, and after Jena, Prussia had to consent to restricting her standing army to little more than a strong army-corps. Why should not similar terms be forced upon us? The command of the sea would then pass to France, and, as an army could at any moment be poured through the tunnel into England, we could never again raise our heads as an independent nation. These events may sound alarmingly improbable, but I contend they are not impossible if the tunnel be ever made, and that its construction will hold out inducements to our enemies to attempt their realization. But it will be said, none of these things could happen without a declaration of war, which must give us ample time for preparation and defensive arrangements of all kinds. Is that so certain? Have no invasions of late years followed so suddenly upon declaration of war as to leave no time for preparation?

Have no countries been absorbed without a declaration of war at all? One feels that the facts are so open, palpable, that to press them further would be only unnecessarily to wound those foreign susceptibilities of which we are so much more tender than of our own. But even if there were no precedents to cause such fears, putting it in a different way, have you the absolute right to expose your neighbour to so tremendous a temptation?

What would be thought of the jeweller who hung the Koh-i-noor dangling by a string, unwatched before his front door? Who would pity him if he lost it? Was there, ever since the world begun, such a jewel to hang dangling before the eyes of rivals and poorer neighbours as is this great unguarded city of ours?

Depend upon it that the "charter of our isle" was granted to her only so long as the guardian belt with which she was girdled remained unbroken. Let her with her own wilful hands drive a rift through it, and who shall hear her cries or pity her when she falls captive to the stranger?

To all this the answer will doubtless be, "We can by fortifications render Dover impregnable." By a lavish expenditure of money you can certainly make it so strong that, *saving accidents*, its capture would mean a lengthened siege carried on under very adverse circumstances, so that no invading army, once landed safely on our coasts, would pause to begin such an operation whilst the road to London was as open to him as it now is, and the capture of that great prize was within his grasp. But the strongest fortress in the world may be taken by surprise or may be surrendered through cowardice or treachery.

Do what you may, therefore; have every preparation made for flooding the tunnel and otherwise destroying it; let our end of it be fortified, and Dover itself converted at unlimited cost into a first-class fortress, still the construction of the tunnel will impose upon England a new and a serious element of danger that must be taken into the calculations of those who, as military advisers, are responsible for preparing plans for its defence, and must be provided against by its Government.

Were this country insured an immunity from invasion by a company or by any foreign military power acting in that capacity there can be no doubt that a largely increased premium would be demanded the day the tunnel was completed. A new risk would have to be calculated for, and therefore to be charged for. This familiar illustration may, I hope, bring home what I want to prove to the most unmilitary mind. Why, therefore, incur even the possibility of this new peril? What are the new advantages, the direct benefits we are to receive, which should induce us to accept any fresh risk to our national life?

Surely, John Bull will not endanger his birthright, his liberty, his property, in fact all that man can hold most dear, whether he be a patriot or merely a selfish cosmopolitan, and whether this subject be regarded from a sentimental or from a material point of view, simply in order that men and women may cross to and fro between England and France without running the risk of sea-sickness.

Even now, when protected by our "silver streak," we suffer from periodical panics, which are as injurious to trade as they are undignified; this tunnel would render their recurrence much more frequent, thereby increasing the loss they occasion. The night does not follow the day more surely than will a vastly increased annual military expenditure follow upon the construction of the tunnel. Are we to be taxed additionally for these new military establishments in order to save a certain number of travellers and tourists of all nations from sea-sickness?

P.S.—Since writing the above a short article on this subject has appeared in a daily newspaper in which the writer sums up as follows:

"The best argument in favour of the tunnel is, however, this:—It is impossible to base the arrangements of a great country like England upon the idea of wars and invasions. To do so would necessitate at once not only a curtailment of our mercantile activity, and therefore of the population, but even an abolition of free trade in corn."

If this question is not to be discussed on military grounds, but if in pursuit of increased "mercantile activity" we are to ignore all dangers which this hunt after riches may possibly entail upon the nation, the outlook for the country is bad indeed.

G. J. WOLSELEY,
Lieut.-General.

10th December, 1881.

THE CHANNEL TUNNEL.

The views of Colonel Sir ANDREW CLARKE, C.B., K.C.M.G., C.I.E., on the Channel Tunnel, were stated in the following paper, which was laid before the Joint Select Committee in 1883:—

The opposition which is now being raised to the construction of the Channel Tunnel is another illustration of the oft-quoted saying that "history repeats itself." Many persons like myself, viewing the discussion that is now taking place, may be prompted to recall impressions formed half a century ago in connection with the agitation and speculation which accompanied the first construction of railways. Though that new mode of communication, which has played so important a part in human civilisation was of home growth, it was met by objections which were raised by grave and responsible professional men. It was said by military authorities that the establishment of such improved means of communication and locomotion would tend to weaken and destroy the obstacles nature had given our island home to check the advance of an invader. Those who examined the evidence given before the Select Committee of the House of Commons that sat to enquire into the project for a line of railway from Southampton to London—almost, if not actually, the first arterial line of our present vast system—will doubtless find that there were then objectors who asserted that the existence of such a line would offer a tempting invitation to an enemy's fleet for the occupation of the Solent and Southampton water, and to use those places as a base from which to operate on London.

If, however, my memory does not deceive me, in the musty records of the Horse Guards and the Treasury may be found a note by the Duke of Wellington deprecating the fears that were expressed in respect to railway development, and showing that this new "resource of civilisation" added materially to the strength and in no way diminished the defensive power of the country. Bearing, as I do, this fact in mind, I am the more surprised that in the present instance the experience of the past does not appear to be a ground of confidence in the present amongst the new alarmists who are so zealously discussing the possibility of unbroken communication between England and the mainland. It would seem as though any such scheme were to be regarded with the same fear and apprehension on the part of respectable authorities as was the construction of the South-Western Railway.

Taking this fact into consideration, and regarding as no longer a matter of theory, the question of the practicability of a tunnel being made, I think it may be of public advantage if I endeavour to offer some reply to a few of the objections that have recently been urged. Those objections are almost solely of a military character, and I believe are of such a kind that they may be easily met. So strong, indeed, is my belief in this respect that were I even to accept to the full all that has been urged on political and general grounds against the establishment of unbroken lines of communication, I should, nevertheless, hold that the resources of military forethought and science are not so used up, but that we could reduce to a minimum, if not obliterate, all possible risk of danger or even of panic from the making of a tunnel between the two countries.

For the sake of argument I will admit that those people who so much overflow with the milk of human kindness, and with confidence in good relations between England and France being preserved, are entirely in the wrong. I will also admit—and the position is one from which we cannot escape—that for all practical purposes we should assume that contingencies may arise in which the French, or any other European nation, would do anything within the range of possibility with the object of invading this country. There are, of course, times when we cannot rely upon any nation being restrained from adopting any given course by moral considerations, and nothing can be gained by attempting to blink such a fact. Nevertheless, before I discuss the alleged disadvantages in a strategic sense of a tunnel being made, and the possibility of defending ourselves from the invasion which it is said that a tunnel would facilitate, I should like to say one or two words about those political and social aspects of the question which military authorities have of late elevated into prominence in the discussion of this matter.

First, then, I ask who are we to dread? Those who reply "France" may be reminded that all our more recent struggles with that country have been dynastic, or on some question as to form of administration. The last struggle for real conquest in which the two countries were concerned was in the case of India—a struggle in which we made ourselves victorious by meeting our enemy on the sea. But a war of rival conquest is not now likely to be initiated by either country, and in these days it can hardly be said that there are any probabilities of dynastic interference on either side. There are, moreover, no individual or social interests which are likely to engender conflict between the two countries, and therefore I am not disposed to attach much serious importance to danger arising from the action of France. On the other hand, however, I cannot disguise from myself the feeling that our position is threatened by the growing interests of more eastern European nations, and that the contingency might arise in which in the still far East we might find ourselves face to face with a European Power whose Asiatic possessions and peoples would not fall far short in extent and number of our own Indian Empire.

How, then, would we be affected by the making of the tunnel in case of difficulty between England and such an Eastern Power? Preserving our alliance with France—an alliance which, if carried into active operation, would enable the two countries to defy the world, and which, if we were left single-handed, would still secure to us the free use of the new means of communication with the Continent—our troops, munitions, and materials could more readily be advanced to any place of attack by the agency which a tunnel would afford; whilst at the same time our fleet, relieved from guarding our commerce in the tunnel, would be free to operate elsewhere. The tunnel would, in fact, be a link literally binding the two countries more closely; and whilst, as I shall hereafter show, it would be of little value for purposes of attack in a conflict between England

and France themselves, it would still be of such use to us as allies that it would strengthen the value of an alliance between the two countries when directed against any other opponent. Thus, so far as England and France are concerned, it would furnish an additional motive for union and sympathy between the leading statesmen on both sides of the Channel.

Perhaps, too, in this respect, it would be well to bear in mind that the traditional military policy of England has always been to carry a war to a point distant from the shores of our own country. For this purpose our fleet has, of course, always been indispensable. But our naval strength would not be one whit weakened by the making of a tunnel which would rather be a means of unbroken communication to assist our fleet in operating upon any obligatory point.

Of course, in its effect upon the commerce of the two countries, as I have hinted, in case of war with Germany or Russia, or (say) with the United States, the tunnel would be a great source of security. With France as a friendly ally, or even taking up a neutral position, our goods would go under the ocean to France and the Continent generally, and we should be under no anxiety as to the cruisers of the enemy seizing them. With Germany rapidly acquiring a foremost place as a naval Power, this is a matter to which some significance should be attached.

I will, however, pass to the consideration of the actual facility for attack which it is said the tunnel would afford. On this point I would say that I think the importance of the protection which "the silver streak" gives has itself been somewhat magnified at the expense of the tunnel scheme. Assuming that a Commander on the French side were charged with the responsibility of conducting operations, and had full control given to him so that he could effect his object in the best possible way, it is extremely probable that, rather than make use of the tunnel he would fall back upon steam transports, so as to make his crossing and attempt a landing. Difficult as the task under any circumstances would be, he would by such means at least have the advantage of knowing to a certainty how he could land the various forces at his disposal; and then, in the presence of an enemy, he would be better able to judge of how he should distribute his troops.

But it is said that what we have to guard against is a surprise. It is theoretically suggested that a number of troops, some 2,000, might be got through the tunnel and secure the entrance on this side. Such a surprise, however, would be a simple impossibility. Are these troops to come without arms and without uniforms, so that their passage and arrival may not be suspected? The sudden movement of such a body could not elude suspicion, for we cannot suppose that all this movement could go on without the railway subordinates, the military or the police getting some hint of it. And even if the suppositious 2,000 men could be secretly conveyed, it is not to be forgotten that their passage would have to be preceded by the massing of an immense force of troops on the other side, which force, it is supposed, might be brought over after the tunnel was secured. Such a massing of troops would, of course, not be the matter of an hour, and it would, if anything, be as difficult to keep secret as the passage of the 2,000.

Let us, however, waive the question of secrecy. Let us suppose that the 2,000 have got through, and the main body is ready to follow. The engine drivers, the signalmen, the linesmen, the pointsmen, the telegraphists, in fact everybody concerned in the working arrangements have either been seized or have gone over to the enemy who have the whole tunnel in their command. The presence of the 2,000, when they were actually on our shores, must then at least be discovered, unless we suppose that emasculation and prostration would have come over everybody and everything. Their presence once known, the practicability of their maintaining their position till any appreciable number of additional troops could arrive for their support would be small indeed, if in fact they were not at once annihilated.

I may, however, go further. Granting that the tunnel was seized and the 2,000 troops were for a time unmolested, the difficulty of passing the main body with the necessary horses and material through the narrow tunnel with sufficient despatch would be simply insuperable, and it is hardly to be doubted that with all allowances made for the advantage of a surprise, a force which could only issue from the end of a caterpillar-like structure in driblets would soon find itself disseminated. In a general way, however, and apart from this I am not inclined to attach much importance to the value of railways for the advance of an army in force, and still less should I do so when that railway was worked in a tunnel. However much railways may be auxiliary to the movements of troops, I am not aware of any instance in which they have served to advance an entire army, and nothing could have shown the difficulty in this respect better than the modern Continental wars have done. Indeed, no one who witnessed what was experienced when we ourselves sent a comparative handful of troops into Afghanistan could fail to appreciate the difficulties which are to be met with when dependence has to be placed on communication by railway alone.

Not, however, further to argue the points involved in the mere movement of troops through a tunnel such as that which it is proposed to construct, it would be absurd to suppose that the art of the military engineer is so exhausted that the tunnel itself could not be secured. For such a purpose various means have been devised. One of the modes suggested is that of driving a subway from Dover Castle to within 15 or 20 feet of the tunnel, placing at this point a quantity of dynamite, the explosion of which would destroy any life in the tunnel, and effectually prevent its further offensive use. No part of this subway could become the subject of surprise unless Dover Castle was taken. Other forts and subways could be constructed, the simultaneous taking of which would be impossible, and so long as one of them remained in our possession the instantaneous stoppage of the tunnel would be at our command. There would, in fact, be no difficulty in utterly destroying the tunnel at any time, though in the larger interests of humanity such a course would properly be deprecated when simpler and equally effective ones could be taken, so far as the mere prevention of the passage of troops is concerned. I should even think that the danger of effective surprise and attack would not be so great that any necessity would exist for bigger fortifications than those which we should now provide to resist attack from the sea.

On all grounds, therefore, I think that the objections against the tunnel being made are not capable of being sustained. And this only I will add—if the industrial and social progress of our country, and the larger interests of humanity can be promoted by a work of this kind, it is not the *rôle* of the soldier to check the aspirations of his countrymen. Then rather, ignoring the imputations that may be made as to the promoters and capitalists being guilty of merely ignoble and sordid motives, let him exercise his service and his art for the removal and not the creation of obstacles to enterprise.

THE CHANNEL TUNNEL.

Memorandum by SIR JOHN ADYE, K.C.B., R.A.

[PRESENTED TO THE JOINT SELECT COMMITTEE, 1883.]

The construction of a submarine tunnel between England and France has, I presume, been undertaken in view of the great advantages which it is supposed will arise to both nations by the improved facilities for general intercourse, and for extended commerce, etc.

I do not propose to give any opinion whether the idea is likely to be successfully carried out, or what the cost will be, nor whether, when completed, it will achieve the intended objects; but I will assume that it has been constructed, and that the railway through it is in working order, and my opinion is invited as to whether, under these circumstances, its existence is likely to be dangerous in a military sense to the security of this country. I must confess that the idea of any great danger to this country being created by the completion of a submarine tunnel did not come across my mind when I heard of it, nor after more careful consideration of the circumstances, has my opinion changed.

The conditions as laid before me are that a tunnel about 20 miles long, running under the Channel at a considerable depth below the bed of the sea, is to reach our shores somewhere in the neighbourhood of Dover.

There appear to be two projects, one that the tunnel shall be brought to Margaret's Bay, between Dover and Walmer, whilst the other takes it to a point between Dover and Folkestone, near Shakespeare's Cliff. But in either case the tunnel, when it reaches our shore, will still be about 150 or 160 feet below high-water mark. Consequently it can only be brought to the level of the open country, and of our system of railways, by means of a gradually rising land tunnel of over two miles long.

Now, I think it will be evident at once, that we cannot be attacked successfully by a direct advance simply through the tunnel. No General, I presume, would dream of bringing his troops (or even of sending an advanced party) for the invasion of England by rail (supposing the rail still there) from France to England, through a tunnel over 20 miles long, and with only a hole to emerge from at the exit. Considering the extreme facility of destroying the invading troops as they successively arrived, by means of a small force with a gun or two at the mouth of the tunnel, that idea may be dismissed; it hardly requires argument. So that, even assuming the tunnel to be in perfect order, no force could possibly use it with any prospect of success, unless they had previously secured possession of our end of it, and were in a position to hold it.

Possession of the English end of the tunnel, therefore, is the first point to be gained, and this can only be obtained either by force or by treachery. Now as to taking position of the English entrance to the tunnel by force, it will be at once observed that if the tunnel is useless to the invaders until that point is achieved, then this country will at the outset be in no more danger after the tunnel has been made than it was before. Because, in order to seize the mouth of the tunnel the enemy must first of all invade England by sea, must establish themselves in sufficient force at some point, and must then proceed to besiege and assault the works of defence at the mouth of the tunnel. Whether the invaders, having once landed at some unknown point on the coast, and in sufficient force to defeat our attempts to drive them into the sea, would care to turn aside to attack our defences at the mouth of the tunnel is, I think, very uncertain. In the first place, they might lose a great deal of time in capturing them, and would feel almost certain that, even if successful, they would only find the tunnel flooded and destroyed. But in the next place they would probably feel a much stronger disposition to march straight on London and finish the campaign. Why, in short, should an enemy, having successfully invaded England, turn aside to capture a very doubtful line of communication, when the main object of his efforts was straight before him?

So far as we have yet gone it comes therefore to this, that the tunnel in itself is of no use as a primary assistance to invasion, and that it can only be useful (if not previously destroyed) after a successful invasion by sea.

As to our entrance of the tunnel being seized by treachery, it seems to me that this is hardly possible. Unless it were seized by a party of sufficient strength to hold it for a time, such an attempt would be useless; and where are the men to come from who would have it in their power to exercise such treachery? I do not quite follow the arguments of those who urge that treachery is practicable in such a case, that is, how a sufficient body of foreign troops is to be brought over and placed in possession of our end of the tunnel.

If the defence of the tunnel exit is, as I have said, a simple operation, the general destruction both of the Channel Tunnel and of the land tunnels, should such be necessary, are equally so. That part under the sea can be destroyed either by explosives or by flooding, whilst the land tunnel, of 2¼ miles long, being under our own land, is entirely at our disposal, and can be entirely destroyed in a variety of ways, and by preparations of a simple character, so that in fact if an enemy did obtain possession by some means of the exit, that would not guarantee the safety of the line of communication. He would only find the tunnel in ruins behind him. In short, a General in France having the intention of invading England would not, in my opinion, count on the tunnel as adding to his resources. He would, I should suppose, look on it as a long and very precarious line of communication, liable to destruction at any moment, and even if not destroyed, so easily defended at our end of it that he would infallibly be thrown back on the whole resources of an invasion by sea. As to the latter, and as to the means by which it would be resisted, it is not necessary for me now to enlarge.

The tunnel may be a foolish venture. It may never be completed; it may, even if completed, be financially a failure; it may not realize any of the objects intended. On all these points I do not care to give an opinion, but as to its dangers in a military sense, and with the most ordinary precautions, I am unable to perceive them. The invention of steam as a motive power for ships, and the creation of large harbours on the French coast are more serious matters for us in a military point of view than any amount of tunnels are likely to be.

But I must go further. Even supposing that a certain amount of danger were caused to this country by the construction of a submarine tunnel from France, I do not think that circumstance in itself would be a sufficient argument against its construction. The advantages of increased means of intercourse between the two countries, and the facilities for commerce, &c., may be so great as to overbalance the possible disadvantages; and in that case it would be our business to take such military precautions as would, whilst leaving it free in peace, enable us to provide against the possible dangers of a state of war.

It surely is not a sound argument that because a certain course may lead to a possible danger in war, we are therefore peremptorily to put a veto on it, and thus to deprive ourselves of the advantages which would accrue in peace. Bear in mind, I give no opinion as to the tunnel itself, that is, whether it is likely to be completed or to be a success, or whether its construction will pay commercially. I am assuming that these points have been considered and determined affirmatively, and if so, our duty then will be to take such military precautions as will prevent its use adversely to our interests in war. On this point I would observe that the tunnels under the Alps are being made apparently with the same general view as the submarine tunnel under the Channel, namely, for improvement of intercourse and facilities of commerce; and in their case the dangers would appear to be far more real than any which can be ascribed to the Channel Tunnel. But the nations at each end, no doubt, feel confident that they can prevent their adverse use in war.

And, again, I would point out that all the great Continental Powers of Europe are united, as it were, by a network of railways, roads, and river communications, all of which afford ready means for invasion in case of war; dangers far and away greater than any we can incur by one long tunnel from one country necessarily terminating at a fixed point or exit in the other. The Continental Powers, however, do not dream of interdicting or blocking these international highways in peace time, because they feel, and rightly so, that the remedy would be far worse than the disease. To destroy or to prevent the means of external communication would, in fact, be intolerable. Consequently, whilst alive to the possible dangers, they confine themselves to minimising them in time of war by obvious military precautions. This is exactly what we shall have to do when the tunnel is completed, but the precautions to be taken by us are fortunately of a very simple character as compared to those entailed on the Continental Powers.

JOHN ADYE,
Lieut.-General.

WAR OFFICE,
January, 1882.

THE CHANNEL TUNNEL.

By LORD SYDENHAM OF COMBE,
Formerly Secretary of the Committee of Imperial Defence.

I am glad to think that the question of the Channel Tunnel is now likely to receive the careful consideration which has been wanting in the past. When, in 1872, the French Government asked for the opinion of H.M. Government, a most favourable reply was given by the Foreign Office, and for thirteen years following the initiation of the project by an Anglo-French Committee in 1867, no objections were raised, and general approval was forthcoming.

In 1880, when the South-Eastern Railway began to make trial shafts between Folkestone and Dover, the military aspects of the question were discussed for the first time by an Inter-departmental Committee, and differences of opinion were at once manifested. Such differences reappeared in the Enquiry by a Joint Committee of both Houses of Parliament in 1883, when a majority reported against the project. As a result, all motions and Bills were subsequently opposed by Government.

Anyone who studies the handling, during a period of 46 years, of this important national question cannot fail to come to the conclusion that the methods adopted have been pre-eminently unsatisfactory and unscientific. Clearly, before considering the military objections, if any, it was essential to enquire into the economic aspects of the Tunnel. Until it could be shown beyond doubt that British trade and industries would benefit, and that the large capital sum required would be remunerative, it was premature to consult military opinion.

In 1870 the Board of Trade appears to have regarded the project as likely to be beneficial to our commercial interests, and some evidence on this point was taken by the Parliamentary Committee; but no attempt has yet been made to ascertain the reasoned opinions of those who alone are qualified to pass judgment upon the first essential point to be decided. It is for the Chambers of Commerce and for students of British economics to speak with authority on this point. If they can show that undersea communications will be to our real advantage in peace, and will in every case, except that of hostilities with France, secure a certain measure of food supply in war, then the military objections will have to be far more cogent than any which have hitherto been imagined to be permitted to prevail.

Since 1883 there have been changes which distinctly favour the Tunnel project.

In the first place our relations with our great neighbour have been placed upon a new basis. It is now much more probable that we may be called upon to send troops to the assistance of France, or to discharge our obligations in regard to Belgian neutrality than that we should be involved in a French war. In my view, the probability or improbability of war with France does not affect the question of the Tunnel, the main justification for which must be based upon its value to trade in peace. But present conditions point plainly to a possible and important military use which was not anticipated in 1883.

In the second place, cross-Channel communications are now less easily guarded in war than formerly. The submarine, whether its efficacy is as great as or less than is expected, will without doubt prove, at least at the outset of war, a menace which could not be disregarded. So much the greater would be the value of a line of communication which would be alike secure against torpedo craft and independent of all weather conditions.

Lastly, we now have electricity as the motive power on which undersea transport would necessarily depend. Apart from other great advantages thus resulting, the fact that the generation of this power, and the consequent control of all train movement over the British half of the Tunnel, can be entirely in our own hands must tend to allay the fears to which imagination has given rise.

It may, therefore, be stated with confidence that, if the Tunnel was a project which Government could support in 1872, the arguments in its favour from the national point of view have since distinctly gained in number and in force.

I think that it may be useful to indicate the nature of the military objections as far as they are known; but unless and until they are presented in a clear and definite form, direct refutation is not possible.

As the views of Lord Wolseley naturally carried great weight in the controversy of the early "eighties," it is desirable to recall the fact that they were based wholly on the hypothesis that the British end of the Tunnel could be seized and held by an act of treachery, at a time when there was not a cloud upon the international

horizon. This is made perfectly clear in the Memorandum, which stated :—

"The seizing of the tunnel by a *coup de main* is, in my opinion, a very simple operation, provided it is done without *any previous warning or intimation whatever* by those who wish to invade the country . . . . My contention is that, were a tunnel made, England, as a nation, could be destroyed without any warning whatever, when Europe was in a condition of *profound peace* . . . . The whole plan is based upon the assumption of its being carried out in a time of profound peace between the two nations, and whilst we were enjoying life in the security and unsuspicion of a fool's paradise."

This tremendous assumption was supported by a long catalogue of wars begun without a previous formal declaration, which may justly be described as absolutely irrelevant to Lord Wolseley's contention. In modern history there is no instance of such an act as Lord Wolseley contemplated during "a time of profound peace" and "without any warning whatever." The modern danger is of a different kind. The immense increase of rapid means of communication has made nations too susceptible to the smallest symptoms of preparation for aggression, and exaggeration of the significance of small measures, leading to mutual suspicion and irritation, is what we have to guard against. If, as is certainly true, mobilizations are now carried out far more rapidly than formerly, the difficulty of keeping them secret has been enhanced correspondingly.

Lord Lansdowne's draft Report of 1883 completely destroys the entire foundation upon which Lord Wolseley's fears were based. "We do not," he wrote, "take the view that the contingency of a *coup de main*, struck by a Power with whom our relations had been friendly and unrestrained, is one which we have any right, or which experience would justify us in placing among the foremost of the probabilities with which we have to deal. It is our impression, on the contrary, that if such an attack were to be made, it would have been preceded by circumstances which would have called for effectual precautions against a surprise. We observe with pleasure that this view is that apparently entertained by His Royal Highness the Commander-in-Chief, and by Sir Lintorn Simmons."

I believe that all thoughtful soldiers will agree with Lord Lansdowne that we have no "right" and that we are not justified by "experience" in accepting the hypothesis on which the objections of Lord Wolseley were based.

If, then, as I have always maintained, we may unhesitatingly reject the bolt from the blue theory, and if reasonable warning can be counted upon, then it is manifest that "effectual precautions" can be taken which will guard our end of the Tunnel, and will enable us in more than one way to put an absolute bar to its use, without destroying a structure which will be the joint property of the French and ourselves. It is easy to suggest precautions which could not fail, unless we are to imagine absolute and sustained imbecility on the part of a combination of individuals.

Another contingency, which may perhaps have influenced opinion, must be noted. In some quarters it has been admitted that, while a *coup de main* is not reasonably probable, England might be successfully invaded, involving the capture of Dover, with possession of the hither end of the Tunnel. I cannot here enter upon the question of invasion, which I have examined at length in the past. I will say only that it is, and must always be, essentially a naval question, bound up, therefore, with our national existence, which could be wrecked without landing a man upon our shores if ever we lose our dominion of the sea. It must be obvious, however, even to those who assume successful invasion as a possibility, that, *ex hypothesi*, superabundant time to effect the destruction of the Tunnel must be available, and that only to France or to a Power which had successfully invaded both France and Great Britain could the possession of the Tunnel be an object of desire.

Lastly, we have been told that, if the Tunnel existed, the country would be liable to unreasoning panics if ever our relations with France showed the least symptom of strain. I cannot accept so low an estimate of our national intelligence. I believe that the millions of people who would have experience of the undersea passage would be the last to feel alarm, because they would have become familiar with the conditions of working, and would realize that a tunnel does not lend itself to hostile operations.

I yield to no one in the firm belief that our insular position has been a supreme national advantage; but I recognise that in our day certain drawbacks inevitably result from the want of through railway communication with the Continent. I hold that the construction of the Channel Tunnel will remove the drawbacks, while preserving the virtues of the "silver streak" and leaving wholly unaffected the naval conditions, on the maintenance of which our existence depends. For these reasons, I have consistently supported the project initiated in 1867, and I have little doubt that, if the question be now dispassionately discussed on grounds of reason alone, misconceptions will disappear, and this great international enterprise will be carried out with lasting benefit to our country.

SYDENHAM OF COMBE.

October, 1913.

THE CHANNEL TUNNEL:

PRECAUTIONS FOR ITS DEFENCE.

LORD SYDENHAM has, at the request of the Editor, written the following Note on "Precautions which might be taken to satisfy the alarmists." Having regard to his brilliant career as a soldier and statesman, to the fact that he is an officer of the highest military and engineering training, and that he rendered, as Secretary to the Committee of Imperial Defence, services which won the unstinted appreciation of three Prime Ministers in succession—Mr. Balfour, Sir Henry Campbell-Bannerman and Mr. Asquith—it may be assumed that Lord Sydenham has here set forth every measure that need be taken for the defence of the Channel Tunnel. It will be seen that he refuses to contemplate in any circumstances the necessity for its permanent destruction.

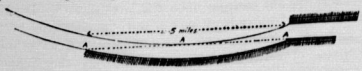
1.—FORTS. Two forts should be brought into connection with the defence arrangements of the Channel Tunnel. They should possess well flanked ditches, and be entered by a single road, passing over a drawbridge. Probably at least one existing fort might be utilised; but, as quite small works would suffice, it might prove more economical to build them *ad hoc* than to adapt existing works. The object of these forts is—

(*a*) To contain and control certain safeguards, and

(*b*) To bring fire to bear on certain points.

2.—TEMPORARY OBSTRUCTION. A portcullis arrangement, combined with a lifting of a section of rails, might be adopted. The portcullis to be at the bottom of a shaft sunk from one of the forts and controlled therefrom. The lowering of the portcullis should automatically actuate the danger signal and hold up a train. The portcullis would be lowered and raised, say, once a week as a matter of routine.

3.—PARTIAL FLOODING. Arrangements should be made to flood by sluices, actuated from a fort, a portion of the Tunnel, say five miles from the Dover end. This portion might be graded thus :—



A gauge would show in the fort when the water level A A A was reached, and would indicate if the level fell. As long as this level was maintained, the Tunnel would be absolutely blocked.

4.—THE POWER STATION should control movement in the British half of the Tunnel. It should be so placed as to be commanded by the guns of one of the forts (1)

5.—OPEN SECTION OF THE LINE. The line should be exposed to fire from the sea for say, half a mile from its point of emergence to the mouth of a second tunnel giving access to the station. The Military Committee objected to this provision on inadequate grounds, and the late Sir John Stokes upheld it strongly. This clear length would, in my opinion, go far to disabuse the public of the idea of mystery connected with a Tunnel. The sea area from which the clear length could be shelled should be commanded by the guns of a fort, which should suffice to prevent small fast vessels from standing in and firing at the exposed portion. A bay of the viaduct should be prepared for demolition, and the exit from the sea as well as the station at which the undersea motive power would cease to operate should be commanded by quick-firing guns in one of the forts. Twelve-pounders would suffice.

6.—PERMANENT DESTRUCTION.—Mine chambers might be prepared to enable the crown of the Tunnel to be blown up. The chambers would need access from a fort involving an independent small shaft and tunnel carried on to a point where there was a good head of water, say not less than five fathoms at low spring tides. The effect would be to create a large leak, which could not be stopped. The electric wires would be always in position, and periodically tested. The charge of explosives could be kept in the fort, and run into position in case of need by a small trolley. (I think this last precaution unnecessary.)

SYDENHAM OF COMBE.

THE CHANNEL TUNNEL.

By the late General Sir WILLIAM BUTLER, G.C.B.

The Channel Tunnel has come back to us after a sleep of twenty-five years, and so have the old nightmares and goblins of that time. There is nothing surprising in the recrudescence of these apparitions. Fear is an incurable prepossession. Against it reason and argument are unavailing. Man must have his bogey, and no man insists upon his right to that inheritance more persistently than the Englishman.

Had the Tunnel from Dover to Calais been made in the eighties, several millions of men, women and children would by this time have passed through it, and the journey under the sea would have become as much a matter of commonplace business as a trip in the "Tuppenny Tube" from Notting Hill to Oxford Street.

Every age is destined to have its particular bogey. In the thirties and forties it was the railroad, a line from London to Portsmouth being, I believe, the chief bogey. It is said that there is in the War Office archives a document from the hand or brain of the Great Duke himself, declaring his opinion that a railroad from Portsmouth to London would *dangerously facilitate the movement of a French Army upon the English Capital!* The bogey of the sixties was the Suez Canal. "What!" cried the prophets of pessimism, "Cut the Isthmus of Suez, and enable a ship to pass from the Mediterranean into the Red Sea. Then good-bye to British supremacy in the East."

The more you are able to prove that the particular project is practicable in an engineering point of view, the more hopeless will be your chance of persuading the bogeyite that his fears are groundless. When at last the canal has been cut, or the railway is made, and it is found that the world still goes on as before—except that there has been a great increase in the comfort and convenience of the general public—everybody exclaims: "Why was not this grand work done sooner?" But the bogeyite is not a bit abashed. He merely transfers his attention to other fields of enterprise, and he scans the horizon of civilization for the appearance of a new enemy.

Fear will always be phalanxed in front of human progress, and behind fear there will be many redoubtable things drawn up, echeloned, to prevent the flanks being turned—vested interests, monopolies, greeds, lusts, possessions and prejudices. The bogey-monger has many allies, and the costumes in his theatrical wardrobe are as numerous as they are varied. Nevertheless, he is invariably beaten in the end—a long end, but inevitable. The engineer wins at last—he spans the river, he widens the thoroughfare, he builds the embankment, he pierces the mountain, he severs the isthmus. For the past forty years Germany, France and Italy have been boring tunnels under the Alps, and nothing terrible has happened.

The strange thing to note about these bogies is that they are always directed against works of utility. Anything in the domain of destruction would appear to be hailed by the bogey builder with enthusiasm. A new explosive, a projectile that will carry from Dover to Calais would evoke his unqualified support. Optimism is always bestowed upon things bellicose; but in the ways of peace and its projects the bogeyman is a pessimist. For an expedition to Tibet or a war in Uganda bogeyism will devote millions of money (not its own, however); but in the cause of anything that would promise to bring the separated nations into bonds of closer knowledge, amity and common purpose—against that he will declare himself ready to die in the last ditch (could he not make it the first?). These people are the Dr. Sangradoes of empire. Hot water and blood-letting for the general public; keep the nations at loggerheads and bleed the taxpayers—that is the recipe.

Now, if Sea Power means anything, it means that it could knock into bits the entire area in which a tunnel under the sea emerges upon the land surface. It can command both ends of such a work and destroy both ends, even if there were not a dozen other ways and means of destroying them, or rendering the Tunnel inoperative for use. One could comprehend the existence of panic in Paris, or that even the French people generally might feel alarm at the proposal to tunnel the Straits of Dover. It might be possible for a British fleet to capture the Continental end by a *coup de main*

and place the twenty odd miles of the submarine road in British hands. And then? Well then, of course, we would all proceed by train to Paris and conquer France.

Well. We had possession of Calais for more than two hundred years; and we held, too, by right of inheritance, about half the entire surface of France. Yet we never conquered France, even in the Plantagenet days, when we were able to fight her single-handed.

The French people are not afraid of this Tunnel, and they are right. It is of interest to note that the thing that happens after any of these great engineering works have been carried into effect is, nine times out of ten, exactly the opposite of what the bogey-mongers had predicted.

The Russian railway across Siberia was to be a "menace to the Far East." It was to "bring about the triumph of the Muscovite on the Pacific shores of Asia." In reality it produced the total collapse of Russia in that part of the world. The Suez Canal, which was to have been a "distinct danger to our Eastern Empire," has, in reality, proved its sheet anchor. What may be the engineering difficulties in the way of the construction of a tunnel under the Straits of Dover; what effect might be produced upon the trade and commerce of Great Britain; what financial results would be likely to ensue from the realisation of this great project; or what return might be anticipated upon the cost of its construction—these are all fair and legitimate subjects for the fullest consideration and discussion. Let them be exhaustively examined and debated. They may be found to afford cogent reasons for rejecting the proposal. But do not let this great field of a possible conquest by the genius of man over the rude forces of Nature be prematurely closed and abandoned, because of old-world fears or prejudices—the belated offspring, begotten in the days when the Cocked Hat and Grey Riding Coat of Napoleon stuck upon a stick on the coast of France were deemed sufficient to frighten all Europe from its propriety.

W. F. B

(This Article was written for a pamphlet published by the Channel Tunnel Company in February, 1907.)

MILITARY FEARS DISPELLED.

By Major-General SIR ALFRED E. TURNER, K.C.B.,

Late Inspector-General, Auxiliary Forces.

Not a Military Question.

It must doubtless appear to favoured individuals blessed with the faculty of exercising broad views upon matters terrestrial, that the majority of those who object to the creation of the Channel Tunnel, upon the grounds that its existence would constitute a military menace to this country, and that it would destroy our insular position and alter our geographical situation, have not been endowed with any considerable share of the sense of proportion. To assert that two small borings 18 feet in breadth and height and 36 feet apart, extending for 24 miles through the bowels of the earth, underneath the sea, and issuing on the French and English coasts by equally exiguous orifices—on our side completely dominated by artillery fire from opposite heights which, moreover, must be like mines, supplied artificially with air—can constitute a facility for the invasion of England, seems a conception too complicated for any person of normal comprehension to grasp. To many it will seem that the question is not essentially a military one at all, and that if the existence of the Tunnel can be shown to be fraught with advantages to the country, commercial and otherwise, all that remains is for the Government to direct the naval and military authorities to devise plans for the best and quickest way of rendering it useless and innocuous in case of the extremely remote contingency of war with France.

The Navy and the Tunnel.

It is believed that the vast majority of the Navy in no way regard the Tunnel as a danger, or as likely to increase the burden of its responsibility for the defence of the country, nine-tenths of which already rest upon its shoulders. Much has been said of the almost general Military opposition to the scheme. This hostility has been greatly over-stated. The scheme possesses no terrors for a large number of Army officers who, being on full pay, are necessarily constrained to desist from expressing their views on the subject. Naturally, those who opposed the Tunnel 24 years ago adhere to the opinions which they then expressed, from which it would be hard, indeed, to stir them, and doubtless also they still cling to the recommendation of Sir Archibald Allison's Committee, which in 1882 suggested that a large fort, with a permanent garrison of 8,000 to 10,000 men, costing as to its construction £1,500,000 to £3,000,000 and as to its annual upkeep £500,000, should be constructed to cover the English orifice. A fitting parallel to such a precaution would be that of a head-keeper who placed a dozen good guns to cover a couple of adjacent rabbit holes.

A Committee of Business Men.

But, surely, it is out of reason to assert that the Army could not make the country safe, as far as its rôle is concerned, in the event of the Tunnel being constructed. If, however, the ridiculous proposition be assumed, that the Army is incapable of carrying out such a task, then, as Mr. Francis Fox, the renowned engineer, has appositely said, the defence of the Tunnel should be handed over to a committee of business men, who have a large stake in the country, and who, at no cost whatever to the public, and with a civilian staff and operators, could effectually forestall all imaginable dangers. Mr. Gladstone once asked a great Military authority whether the idea really existed in the minds of some persons that "England could be invaded by means of a pinhole." One might almost add that it would be easier for a camel to pass through the eye of a needle than for an invading force to make an irruption upon our shores through the Channel Tunnel.

The English End of the Tunnel.

Again, it has been asserted that it is not so much an attack through the Tunnel that need be dreaded as the sudden invasion of England in the ordinary manner by an enemy who would proceed to seize the English end of the Tunnel, and then utilize it for his own purposes. Such irruptions cannot, however, be made without warnings; and, if we allow that they might be attempted without a formal declaration of war, they would certainly be preceded by those strained relations which have ever been the precursor of hostilities, and which would suffice to put all our ports and garrisons on the most acute *qui vive*, and render such surprise impossible. I notice that a distinguished officer has mentioned as a matter of surprise the outbreak of the Franco-German War in July, 1870. In a military sense there was no surprise whatever. The French *ultimatum* was rejected by the King of Prussia on July 13th. On the following day the

French Emperor issued orders to mobilize the Army, and similar orders were given by King William on the 15th July. The frontier was not crossed by the Germans till a fortnight later, and there was nothing like a serious collision till August 2nd, when the combat of Saarbrücken was fought.

Again, it is premised that a fleet of French ships might land a force at Dover under cover of a dense fog, and capture the Tunnel. It is not, however, suggested how the darkness in which the enemy also would be enveloped owing to the fog is to be lightened, nor how, in such a condition of obscurity, he could land troops enough to carry out their fell purpose.

The "Treachery" Theory.

The further suggestion that Dover, and with it the Tunnel, might be handed over to an enemy through bribes and treachery, does not seem to merit sober consideration. I am not aware of any instance in the Military history of our country in which an attempt to betray has ever been made by officer or man, and the suggestion that such infamy has suddenly become possible appears to be quite unnecessary and unfounded. People of calm judgment will not forget that if the pessimists had been allowed to have their way, the Suez Canal would not have been made. Lord Palmerston and others predicted that it would be a "serious danger to our Indian Empire."

Over-Sea Carrying Trade.

Another curious argument has been used—that the existence of the Tunnel would be a serious blow to our over-sea carrying trade, and to our lines of railway running to the south coast, as well as to the connecting sea services with France. But the cost of passage and freight by the Tunnel will be higher than that over-sea *vid* Dieppe and other routes, as are now those *vid* Dover and Calais, or Folkestone and Boulogne; and as the Traffic on the latter routes by no means takes away from that on the former, so we may rest assured that the cheaper fares and freight will be adopted, just to the same extent as now.

Not a Scintilla of Danger.

It is not, however, upon financial or commercial grounds that I venture to enunciate opinions in favour of the Channel Tube. I leave that to others much more competent than myself. All I am anxious to show is, that knowing well the exact site at which it is proposed that the twin Tubes should issue into the open, I am firmly convinced that there could not be a scintilla of danger to us from the existence of the Channel Tunnel. Not only, as before stated, would the orifice be completely commanded by the Western Heights, but, without any serious destruction. the mouth of the Tunnel could be effectively blocked by mechanical contrivances, or the Tubes could be made to emerge on a viaduct far above the level of the ground, so that the destruction of the viaduct would prevent all chances of trains coming out of the Tunnel, except to unutterable annihilation. If this were not considered adequate, sections of the Tubes could be flooded without difficulty, and without permanent injury to the railway.

The Button Absurdity.

A quarter of a century ago the country was supposed to be guarded by the medium of a button, by pressing which the Tunnel would be actually destroyed by explosives. In this idea the possibility of accidental explosions was involved, and it was argued, and rightly argued, that the responsibility of pressing a button, which act would result in the wholesale destruction of many millions of property, was too great to put upon the shoulders of any one man. Most people will, no doubt, agree that if such a deed of ravage and ruin were even a remote possibility, it would be wiser to have no Tunnel at all. But, as a matter of fact, there is no reality in the supposed existence of the momentous little button, nor in that of the lethal chambers of death-dealing explosives with their awful potentialities.

Invasion Impossible.

It must likewise be borne in mind that the Tubes would, like mines, be ventilated by artificial means, which could be at any moment arrested, with the certainty of asphyxiating every living being in the Tunnel. It would thus seem clear, that an attempt to use the Tunnel for purposes of invasion would be infinitely more deadly to the assailants than to the assailed.

Railway Transport.

The English end of the Tunnel would open out between two hills, and the French Military Staff—who have surely quite as strong grounds as ourselves to feel nervous as regards this submarine communication between the two countries—scout the idea of its being used for purposes of invasion by either country. They point out, moreover, that railway transport is a most delicate and difficult matter, and that it is impossible successfully to carry it out, unless special and detailed arrangements have been made for detraining, without which co-ordinate concentration is impossible. Surely no one will be so unpatriotic, and so much of a real "Little Englander" as to assert that our Military Authorities would be less wide-awake and less able to prevent and crush such concentration, than would be the French on their side of the Channel! To meet all

possible apprehensions on our part, the French promoters are, however, prepared to construct their portion of the work in such a manner that the line, before entering the Tunnel on the French side, shall make a curve on a high viaduct erected parallel to the seashore, so that it should at all times be exposed to the fire of British warships in the Channel. This shore structure could thus be easily demolished, and the Tunnel rendered unapproachable and, therefore, utterly useless. All objections to the existence of the Tunnel thus appear to be, as termed by the French, the purest *enfantillage*.

The Command of the Sea.

Lastly, with regard to the argument that if the French made a successful invasion of this country, the Tunnel would prove of great value to them, there is nothing to be gainsaid, except this, that if such successful invasion by France, or any other nation, were accomplished, it could only be possible after the destruction of the Navy and the loss of our command of the sea, which would imply also the loss of our food supply, and our inevitable submission. It is certain that no nation would attempt the serious invasion of our country till it had secured the command of the sea, nor is it likely that any power would be so insane as to make a raid of, say, 10,000 men upon our shores. If such a proceeding were attempted, the result would inevitably be a repetition of the disaster that befel General Humbert's brave little force at Ballynamuck in 1798. For the purpose of creating panic, discomfiture, and some loss and destruction, is it likely that any foreign Government would commit bodies of their troops to certain annihilation and capture?

The National Food Supply.

If the Navy should really consider that the existence of the Channel Tube involved any decrease of our sea power, and that it was outside the capabilities of our land forces to guard its exit, the question must come to an end, for the former is not only the means by which we remain a first-class Power, but in war our very existence would depend upon its maintenance. Three-quarters of our wheat and flour, half our meat, a large part of our fruit and vegetables, and all the tea, coffee, cocoa, sugar, rice and sago come from abroad. The annual import of foreign food is reckoned at 14,500,000 tons, of which 9,500,000 tons consist of different kinds of corn. The total amount of wheat and flour consumed is 5,700,000 tons, and of this only 1,360,000 tons is home produced.

Industrial Considerations.

This question of food supply involves the greatest danger that Great Britain can be called upon to face.*

* "Would War mean Starvation," by Mr. Spenser Wilkinson.

Captain Stewart Murray, making use of the inquiries of Mr. Charles Booth and Mr. Rowntree, has estimated that of our population of between 42,000,000 and 43,000,000, 25,000,000 are urban, or collected in large populous centres. Of these, there are:—

(*a*) In poverty, supported on wages of 23s. a week or less, 7,675,000.

(*b*) In comparative comfort, supported on wages of 23s. to 50s. a week, 12,875,000.

Upper and middle classes, 4,450,000.

War with a European Power.

A war with a European Power would at once mean reduction of our imports and exports, want of employment, reduction of our food supply, and great rise in the price of food, and consequent distress, hunger and starvation. The effects of this would first fall upon our huge proletariat and propertyless class, who, when their wives and children began to starve, would rise, and by means which would not be disregarded, force the Government to sue for terms. This terrible condition of things is highly improbable, but not impossible in case of war. It is reckoned that there is never more than five to six weeks' supply of food in the United Kingdom.

Good Relations with France.

Let us suppose such a growth of sea power in another nation that it endeavoured to wrest from us the command of the sea. It would be at once the enemy's object to strike us in our most tender spot—attacking by means of fast cruisers our merchantmen, while the bulk of our Navy was employed in endeavouring to destroy that of the enemy. Our greatest trouble and danger—restriction of our food supply—would immediately arise, and, supposing that we were on terms of friendship with France, the existence of the Tunnel would be of incalculable value to us, inasmuch as food could then be poured into the country without obstruction from the enemy's warships. This is a definite and possible benefit which we may derive from maintaining good relations with France, and by constructing in agreement with her the Channel Tunnel. Such a war, however, it must be admitted, is as improbable as a war with France herself.

An International Agreement.

Surely the best, safest, and easiest course—and the one most in accordance with ordinary common sense—would be that an international agreement should be entered into between England and France so as to secure that the Tunnel should not under any circumstances be utilized for the purposes of war. Such an agreement would set the fears and apprehensions of the timid at rest, as nothing else could do so effectively. The suggestion that Germany might successfully invade France,

and then turn her attentions to us through the Channel Tubes need not seriously be considered, as it may surely be presumed that if there were such a war, or even rumour of such war in the air, the British people and Army would hardly be lethargic or asleep.

The Potentialities of Aeroplanes.

The predicted potentialities of aeroplanes, which cannot be obstructed, will doubtless produce in time to come such a ghastly and terrible instrument of warfare that their existence will tend to the preservation of peace, so that out of great evil great good may arise. But that a pair of narrow borings connecting two countries by an underground and submarine passage can be regarded in any way as constituting a serious factor of warfare appears to be inconsistent with calm and collected judgment, and with a knowledge of the true facts of the case. It is hard, indeed, to believe that in this century nervousness and vain fears will be allowed to obstruct or defeat this great project, or that the "pale cast of thought" should be permitted to prevent "an enterprise of great pith and moment" such as is the creation of the Channel Tunnel.

January, 1907.

The foregoing was written early in 1907, before the effort which was being made to obtain Parliamentary sanction to the creation of the Channel Tunnel failed, owing to the conclusion arrived at by the Government that there would be no risk whatever of invasion by means of the Tunnel, but that there was a possibility that the people might think there was danger, and be panic-struck in consequence.

There is little to add to or modify what I then wrote, except that the then predicted potentialities of flying machines have been realised, and England has lost her insularity, as far as the latter could shield her from the risk of invasion with which countries possessing coterminous land frontiers are confronted. We could be invaded from France by a very large number of aerial machines, in an exceedingly short space of time. Such machines would inflict indescribable damage, and create infinitely greater and justifiable commotion than the Channel Tunnel could ever call forth. Again, the question of our food supply becomes more and more important as time goes on, and the advantages of the Channel Tunnel in this respect, so long as we are not at war with France, are evident to all who will see.

The hypothesis that Great Britain might lose the command of the sea is now further from possibility of realisation than ever, as shown so clearly by "Excubitor," in his article "The Balance of Power in Europe: Germany's Decline," published in the *Fortnightly Review*, September, 1913. The author of that remarkable contribution demonstrates the overwhelming sea power of Great Britain, and explains that Germany, of whose Navy we were so much afraid up till lately, has made a deadly mistake in piling up her ships and increasing her armaments, thereby, of course, compelling all other nations that could do so to follow her example, the result being that she is now proportionately less powerful than she was before she started the mad race of armaments; while she has thereby run up the taxation of the civilized world to an extent which well-nigh passes the limit of toleration. England has nothing to fear from the fleet of Germany or that of any other Power as to attack and seizure of the Channel Tunnel.

Another argument advanced—that the creation of the Tunnel would be unsafe unless and until we have universal military service in Great Britain—does not seem to me to be tenable. Only a mere handful of men would be needed to guard the Dover entrance to the submarine railway. Opinions vary considerably as to conscription. I have been opposed to it, provided that the Territorial Force could be kept up to the minimum strength which the Military experts—by whose opinion we must be guided—consider necessary to secure us immunity from invasion. As the Territorial Force constantly falls in numbers, and is now about 55,000 men short of the minimum of safety, it seems that, after all, conscription may possibly be forced upon us. To contend, however, that the existence of two small Tunnels should depend upon a question of enormous importance such as that of the creation of a large army by conscription, seems to indicate a slight lack in the sense of proportion.

It is notable that many prominent men who were strongly opposed to the Channel Tunnel in 1907 have completely changed their mind, recognizing the fact that the development of war aircraft has revolutionised the condition of things under which England would look upon her insularity as her safeguard.

Alfred E. Turner.

October, 1913.

THE CHANNEL TUNNEL.

By Lieut.-Colonel ALSAGER POLLOCK.

The primary foundations of sound strategy are:—

(1) The means and measures adopted in respect of each particular situation must, within the limits of possible attainment, be adequate and suitable to the occasion, and must further be supplemented by sagacious preparation against conceivable eventualities.

(2) Dangers present or impending are more satisfactorily to be overcome by preventing their development, than by subsequently combatting them never so successfully. In other words, Hydras while yet in their cradles may be slain with comparative ease.

(3) No defensive strategy is in any circumstances worthy of the name, unless it include offensive elements, and a bold resolve to employ them to the utmost.

Such are the points of view from which I initially regard the problem of the Channel Tunnel.

The bed-rock of British Imperial and National existence is Sea Power, and not since the eighteenth century, until the present time, has it shown signs of inability to support its burden.

To prevent any attempts to undermine this bed-rock is manifestly essential to the security of the Empire and of the Kingdom itself.

Navies are now many and strong; whereas they were formerly few, and, with the exception of our own, weak. Our naval situation is at present altogether different from what it was in the epoch of Trafalgar.

Were the existing navies of Europe to be combined against us by some new Napoleon, we should most certainly be undone. Therefore, it imposes itself upon us to prevent such a combination. This we can do only by action calculated to preserve effectually the "Balance of Power in Europe."

For the same reason that we fought Napoleonic France, must we always be prepared to resist the progress of any Power, or coalition of Powers, towards attaining an hegemony in Europe.

The Triple Alliance displays aggressive tendencies that are absent from the policy of the Dual Alliance, and therefore it is that we have an *entente* with each member of the latter. Owing to the numerical superiority of the German over the French army, France is in danger of being overthrown before the strength of Russia could make itself felt. Upon the United Kingdom, therefore, it falls to bridge the gap. We must be not only willing but able to support France, promptly and assuredly, with every available British soldier.

Folly, timidity, or possibly even genuine naval difficulties, might cause delay in the despatch of British reinforcements across the Channel, with supremely disastrous results. The collapse of France would *ipso facto* involve the splitting of our naval bed-rock, because the naval power of France would become disposable by her conqueror.

The Channel Tunnel has, therefore, ceased to be a question of commercial enterprise; it is now, for the United Kingdom, a strategical necessity of the preventive category.

Let it be granted that the seizure of the Tunnel by an invader of France would for us constitute a very serious danger. No sane person would venture to deny this obvious truth. Nevertheless, when faced by a choice of evils, it is usually well to embrace the lesser. The danger suggested could only arise after France had been worsted; and by preventing the latter evil, we shall at the same time prevent the other. Having the Tunnel, we can surely send aid to France, whereas without it we might be prevented or delayed. Moreover, assuming the Mediterranean to be dominated by the Anglo-French fleets, the difficulties of British food-supply in time of war would, by means of the Tunnel, be considerably reduced. Therefore, let the Tunnel be constructed as quickly as possible.

The day may come when France herself, now our friend, may be again our enemy. But if we are clever enough to construct a Tunnel, surely we can at the same time provide means whereby it may readily be rendered impassable?

In strategy, as in business and commerce, they are successful who know how to weigh against each other the chances of profit and of loss. Without facing risks, neither victory in war nor profit in business can be won. Knowledge that a motor-'bus is capable of killing him is no reason why a man should refrain from crossing a street in order to get his lunch.

In my opinion, the arguments usually employed against the Channel Tunnel boil down into advising John Bull to commit suicide rather than face a remote danger of being killed.

Colonel Pollock has, by permission, reproduced the foregoing contribution in the "United Service Magazine," of which he is editor, with the following introductory note:—

"For many years I was strongly opposed to British insularity being undermined by the construction of a Channel Tunnel. My contention was that, although timely obstruction of hostile passage might theoretically be assured, practical possibilities do not invariably accord with theoretical conclusions; and that it is manifestly foolish to incur, without very good reason, risks of disaster, however apparently negligible. But this argument which, in my opinion, formerly constituted a perfectly valid objection, has by the march of events been rendered obsolete. The risk to the United Kingdom involved by a Channel Tunnel remains, indeed, precisely the same as heretofore, but it is now counterbalanced by advantages of immeasurably greater importance. The strategical conditions of British Defence have been so entirely altered, that what we were wont to regard as a possible source of danger, has become an indispensable safeguard. I am firmly convinced that if the late Lord Wolseley had lived to consider the question of the Channel Tunnel in the light of recent naval developments in foreign countries, he would have declared in favour of the scheme as decidedly as in other conditions he protested against it."

THE FOOD OF THE PEOPLE.

By Commander E. HAMILTON CURREY, R.N.

War, besides being terrible, is also paradoxical. It has for its object the disablement of the enemy, and civilisation has decided that in war there are some things that you may, and others that you may not do. It is not allowable to use explosive bullets in small arms, though incidentally you may blow up ships with torpedoes, and sweep regiments off the face of the earth with shrapnel. Also, you may not poison wells, or torture the individual prisoner whom you capture. On the other hand, it is perfectly legitimate to inflict on a garrison the most refined torture in the way of hunger and thirst—you are allowed by the rules of the game to cut off his water supply, and to deprive him of his food.

Now our "sceptred isle" is in the position of a garrison, and the number of that garrison runs to between forty and fifty millions of people. Further, in case of war, that garrison incurs a very imminent danger of starvation. How imminent that danger is can be recognised by anyone, not merely by the dry method of the study of statistics, but by walking down to the quays of any of our big seaports, and watching for him or herself the way in which the foodstuffs are pouring into the country. This is a stream which ceases not by day or by night, "lest the street-bred people die." Yet so automatic is the supply that these same people never pause to think whence comes their daily bread, their daily meat, their daily vegetables, their daily poultry—in fact, almost everything that they consume, save the milk which arrives by train from the dairy farms.

If you watch a well-constructed engine running, it is a joy to the senses—so smooth, so accurate is the service that it gives, so delightfully is power wedded to speed. So pleasant is it to watch its automatic efficiency that the spectator lingers to enjoy this manifestation of human ingenuity. Yet that engine depends upon two things, fuel and lubrication, and if starved of either the one or the other, it will automatically stop. The fuel that runs a great nation is the food that it eats, the lubrication is the power of which it disposes to see that the food supply is not interrupted. We speak in this country often and anxiously of the danger of invasion; and it is well to guard against any possibility of so terrible an eventuality. Invasion is a possibility, as many other things are possibilities in this world, but it is remote owing to the sea power of which Great Britain disposes, as also in regard to technical naval and military factors into which it is not here necessary to enter.

But the starvation of the garrison of these islands, represented by every man, woman and child that dwell within their confines, is another matter altogether. For the food comes from over the sea, and to interrupt that food supply would be the pre-occupation of any potential foe. Great is the might of Britain on the waters. Yet is the ocean wide, and destruction of the stately liner, and her humble sister the cargo "tramp" is within the competence of the most insignificant warship. From Canada and the United States of America, from Australia and New Zealand, from China and Ceylon, from Odessa and Rostov on the Don—from every cardinal point of the compass, and all those that intermediately lie between—come the ships bound for Liverpool and London River, for Bristol and Hull, for the Tyne ports and Sunderland, and their freight is the food of the people.

Somewhere, collecting dust on the dim shelves of a Government department, is the report of a Royal Commission on the subject of establishing granaries in England, with a view to storing grain so that there might be some reserve upon which to draw at the time when the last protocol has been written, the ambassador has been politely escorted to the frontier, and in the wind-swept sea spaces the twelve-inch gun and the heater torpedo have begun their deadly work. There was a Commission and a report, but nothing has been, or is ever likely to be done, and the inquiry might just as well never have been held.

What will happen when "the day" arrives? The answer to that question is still to seek, and fortune lies on the knees of the gods. There is one matter, however, which we can forecast with tolerable certainty. Should war come, there will be an immediate—one might almost say almost an automatic—disturbance of the food supply. This will be accompanied by such a rise in prices as to place the very poor—those who even in time of peace find it hard to live—perilously near to starvation. And what then? The possibility of the uprising of a famine-stricken people demanding peace at any price that to them will restore their daily bread.

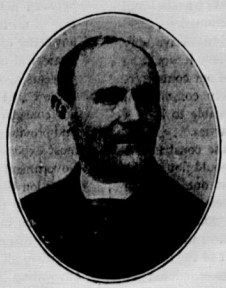
The idea of storing grain in this country is undoubtedly a good one. But still better is that of those who propose to solve this difficulty by means of a Tunnel beneath the English Channel. When a great

work like this is projected, it is the duty of those interested to study it from every point of view. The objection to the Channel Tunnel is, and always has been, that by it the realms of His Majesty would be laid open to invasion. There is really a little too much nervousness about nowadays, and those who see in a double tramway track under the sea, actuated by electricity, a danger to the State are really seeking for a bogey with which to frighten themselves.

Into the commercial aspect of the scheme it is not the place here to enter. It may, however, be noted that the promoters do not come to the British Government for one penny with which to carry out that which they have in view. Should war ever occur in this country, the food supply is bound to be the difficulty. All the King's ships and all the King's men cannot prevent an immediate and a disastrous rise in the price of food, supposing that we were opposed by a brave and resourceful enemy, as there is every reason to imagine would be the case. After many years, we have arrived at an amicable arrangement with our nearest neighbours on the Continent of Europe; and again, should war come, with this hole beneath the stormy Channel waters, we could place our Expeditionary Force on the soil of France within a very few hours, and absolutely without risk to them.

But war, thank God, is not the normal state of civilised mankind, and in time of peace the Channel Tunnel would be an incalculable boon to millions of persons of all nationalities. This, of course, is not, and never has been in dispute. The question of invasion is what has kept the scheme hung up, waiting for a favourable moment. It all hinges on the question as to whether the danger or the advantage to England in time of war is the greater. On one side of that fence or the other we must descend, and weighed in the balance it would seem that the advantage has it. In a congested and over-populated land it is worth a much larger risk than the one involved to secure that one avenue by which food may reach the country can never be closed.

It is competent to reply that were we in the future to be at odds with our great neighbour, France, we might have cause to regret that we ever allowed the Tunnel to be made. In this life, however, it is well not to say good morning to the devil till you meet him, and mortals cannot peer into the future. Even if so regrettable a state of affairs were again to happen that we were involved in a serious quarrel with France—that we feared invasion by way of the Tunnel so much that we could no longer sleep in our beds at night—there would always remain in our hands that invaluable button, which when pressed would resolve the Channel Tunnel into that "lower grey chalk" from which it had been originally dug.



M. ALBERT SARTIAUX,

CHIEF ENGINEER FOR ROADS AND BRIDGES TO THE FRENCH GOVERNMENT; ALSO GENERAL MANAGER, NORTHERN RAILWAY OF FRANCE.

The Channel Tunnel between France and England.

By M. ALBERT SARTIAUX,

Chief Engineer for Roads and Bridges to the French Government; also General Manager, Northern Railway of France.

(Translated from the "*Revue des Deux Mondes*," October, 1913).

A really interesting event, and one which will be prominent in the history of the Franco-British relations happened a few weeks back in London.

On Tuesday, August 5th, 1913, a group consisting of 18 British Members of Parliament, * representing 90 of their colleagues of all parties, paid a visit to the Premier, Mr. Asquith, at the House of Commons, to remind him of the existence of a long-delayed project for the construction of a Channel Tunnel, and to put forward in very lively terms the necessity in Great Britain's interest to start and complete this great work as soon as possible. The text of the petition, the Prime Minister's reply, and the discussion which followed, are documents which should be given *in extenso*.

We will simply give below a brief summary of the most striking passages:—

"Our commission started from a spontaneous movement, and was not encouraged by any Railway Company or by the previous Channel Tunnel Company; we are guided by no personal interest. We simply believe that the realisation of a tunnel scheme would be a source of tremendous benefit to the commerce of both countries, that it would increase the cordiality of our Continental friends, and encourage exchanges with foreign countries.

"Personally, we cannot possibly derive any benefit from the scheme, but we believe it would be to the advantage of our country and our commerce.

"Our commission is not a party commission. We have endeavoured as far as possible to keep a proper balance between the two parties."

"Our only object is to obtain the construction of the tunnel, an enterprise which should not belong to any special party. I may point out that the commission includes a large number of Members and Army Officers, who, in years gone by, were opposed to the tunnel, but are now warm advocates."

At this point of his speech the speaker of the deputation explained the motives for this change of opinion:—

"My colleagues believe that the problem of supplying food-stuffs to our country in time of war is far more important than it was 30 years ago, when for the first time this point was raised."

And he furthermore adds:—

"I have glanced over the reports made out on that occasion, and I notice that this matter of supplying provisions was not even mentioned at that time, and that it was not pointed out that the tunnel would be a very powerful auxiliary by assuring an increase of the food supply in time of war."

He then examines the scheme under its new aspects:—

"We consider that the tunnel would enable us to have a supplement of food-stuffs, in the event of war with any country, with the exception of France, and the mere fact of knowing that food-stuffs could be obtained from the Continent if the maritime routes were closed to our ships, would prevent a panic and an increase in the price of bread. *In our opinion the latest improvements in aerial navigation have altered our position, and nobody can tell what the final consequences of this event will be.*

"Our friendship with France, which has been maintained for 98 years under the most varied circumstances, is assured, and the building of the tunnel would still further strengthen this friendship. Furthermore, not to improve the means of transit between neighbours and between friends through fear of an invasion on their part seems absolutely unworthy of a great nation. I will not mention the strategical reasons which were successfully opposed 30 years ago to the construction of the tunnel, and I know that the opinion of the military authorities has considerably changed on this point, and, as I said previously, our commission includes some of the most experienced Army Officers. We ask that the Government should push forward the scheme, under condition that the strategical requirements shall be fulfilled by the promoters.

"I am sure that the tunnel engineers, when they discuss this matter with the War Office, will be able to satisfy all reasonable requirements. We are not advocating the interest of the Channel Tunnel Company, we simply wish that the Channel Tunnel should be built. It has been said that the English Government would build this tunnel, together with the French Government, or that the Channel Tunnel Company, helped by the French and English Railway Companies, would be authorised to proceed with the construction."

To Mr. Arthur Fell's speech, which was characterised by truly novel ideas expressed in manly terms, and with a really broad outlook, and after a highly interesting

* The Deputation was made up of the following Members of Parliament:—Messrs. Arthur Fell, Russell Rea, T. P. O'Connor, James Parker, Charles Schwann, Bart. Rawlinson, William Bull, Colonel Yates, Major Dalrymple, White, William Byles, Gershom, Stewart, Arthur Lynch, John O'Connor, Cecil Beck, Colonel Greig.

discussion in which Colonel Yates, M.P., Mr. Russel Rea, M.P., Mr. T. P. O'Connor, M.P., Mr. Parker, M.P., and Sir W. Byles, M.P., took part, the Premier made a reply which deserves a special mention.

With the circumspection of a Government Chief, Mr. Asquith stated that it was impossible to entirely lay aside the opposition shown by previous Governments to the tunnel scheme, which was actively carried on between 1875 and 1880, and suddenly stopped since then. He mentioned that Lord Wolseley, the great authority on military matters, was a most determined opponent to any project of piercing the tunnel, and destroying what he regarded as Great Britain's security.

> "You ask our Government to reverse the decision of a quarter of a century. Of course, this is a matter which is not to be lightly undertaken."

But nevertheless he recognises immediately that this question is now considerably altered, and he went on as follows :—

> "There are, I agree, new factors, and one of them—perhaps the most hopeful, and in some ways the most important—is the establishment on a solid and, I believe, unshaken basis of our friendship with France. Of course, the potential enemy in the apprehension of Lord Wolseley, and those who adopted his view, and the potential enemy whose power of offence and aggression would or might be assisted by the tunnel, was France. The possibility of such an enemy has faded away through the excellent and cordial relations which, ever since the agreement of 1904, nearly ten years, we have maintained between the two countries, ourselves and our friends on the other side of the Channel."
>
> "There are again, I consider, other new factors in relation to forms of naval and military warfare, and the source and distribution of our food supplies which undoubtedly deserve consideration."

His conclusion was that the matter would be freshly examined, and this has now been started upon, and that the Government would approach this question with an unbiassed mind, and give consideration to the points raised by the deputation.

The question of the submarine tunnel between France and England, after having been left in a state of slumber for a large number of years, seems to be now awakening, and perhaps the readers of this review may find it interesting to become acquainted with the history of this project from the diplomatical and administrative point of view, to have an insight of the technical part of the scheme, and also to grasp the importance of the results which will be obtained by the realisation of this scheme from the economical and commercial point of view, and also from the political and military points of view.

Historical Account.

The first business-like attempts which were made to artificially re-establish by means of a tunnel the connection between lands which (according to the statement of the learned Stanislas Meunier would only be the reproduction of a previous state of things) started in the middle of the 19th century, and were put forward by a civil engineer named Thomé de Gamond, who for the first time gave to the scheme a truly scientific aspect.

In 1856 he presented simultaneously to Napoleon III. and Her Majesty Queen Victoria and Prince Albert a project for the construction of a tunnel under the Channel.

In 1869 an Anglo-French Committee was appointed for the purpose of obtaining a concession and forming companies on each side of the Straits to carry out the work.

In 1870, in the month of April, begins the diplomatic phase of the project. At the request of the Anglo-French Committee, the French Ambassador asked the British Government if it were disposed to admit the principle of the enterprise, and consequently to regulate by a diplomatic convention the conditions on which the construction and working of the new Railway would be authorised. (The Marquis de la Valette to Lord Clarendon, April 15th, 1870.)

Lord Clarendon's first reply was that England could only guarantee the honesty and good faith of the British subjects interested in the matter, but that facts were still missing to enable him to decide on the possibility of executing such an enormous enterprise, and on the expenses of its execution.

The war with Germany put an end for the time to the negotiations, which were taken up again, however, as soon as peace was re-established.

Indeed, by November 30th, 1871, M. de Remusat, the Minister for Foreign Affairs in Paris, renewed the question which had already been put before the British Government by M. de la Valette. Meantime, the Anglo-French Committee were moving on their side, and the Secretary of State for Foreign Affairs, Lord Granville, was not taken unawares. The Board of Trade, on being consulted, gave a favourable opinion under certain conditions, and on June 24th, 1872, Lord Lyons, the British Ambassador in Paris, acting on instructions from London, sent to M. de Remusat a very explicit note, in which he gave a formal adhesion to the principle of the tunnel projected between France and England, with certain reservations, bearing solely on the conditions of the concession, and the execution of the submarine railway.

These reservations, far from lessening the acceptance of the principle, emphasizes the spirit in which it was given. The British Government thought that the technical difficulties of the undertaking might be overcome, but wondered if it could be arrived at financially without the aid of the State.

It declared itself against the concession being granted for ever to a private Company, and was of the opinion that the two Governments should agree on terms for redeeming the concession.

In the following year a still more formal adhesion, if possible, was given to the principle of the tunnel, and it is worthy of notice that this time it was through the instigation of the Board of Trade itself, and by the initiative of Lord Granville that the question was again taken up. On July 23rd his Lordship thought necessary to indicate to Lord Lyons how he should reply, were he questioned as to the dispositions of England on the subject of the tunnel project. In that case the Ambassador should answer that Her Majesty's Government would see with satisfaction any improvement in the communications between England and the Continent, and that it would be happy, in consequence, to hear of the success of an undertaking destined to connect the British railways with the Continental railway system.

The British Government, opposed as it was to the principle of the monopoly, did not see any objection to a concession being granted to the promoters of the enterprise, under the ordinary conditions of contracts of this character in France, provided that the conditions of a lease with terms of redemption counteracted the establishment of a monopoly prejudicial to public interest.

It was obvious that it was not only the question of principle which had been agreed to, but that the British Government was already considering the conditions under which it would subordinate the concession of the line.

At last, on July 25th, 1873, Lord Lyons, who always followed his instructions strictly to the letter, asked if he should spontaneously complete by a memorandum the preceding explanations which he had given to the French Government.

The reply of the British Cabinet was in the affirmative, and the memorandum was handed to our Government by Lord Lyons.

Let us add that a note at the foot of a page of the Blue Book containing Lord Granville's letter of July 23rd explains the steps taken by the British Minister for Foreign Affairs, and emphasizes the insistence with which he gave his adhesion to the tunnel project, and his encouragement to the undertaking.

In the presence of such a complete agreement the French Government saw no more obstacles to prevent granting the concession for the railway under the Channel.

However, a Conservative ministry had just succeeded in England to that of Mr. Gladstone, which had shown itself so broad-minded in the study of the project, and which had a really prophetic foresight of the future. The French Government on October 27th, 1874, that is to say, almost on the eve of the granting of the concession, communicated to the British Government, through the medium of Count de Jarnac, our Ambassador in London, the very terms of the Act by which it proposed to grant his concession. In the reply, which was under the form of a written note sent to the said Count on December 24th, 1874, Lord Derby, Minister for Foreign Affairs, gave his adhesion to all the conditions of the draft; he recognized the right of both countries to establish works of defence at the extremities of the tunnel, without mentioning, however, on whom the expenses would devolve; he stipulated the power of interrupting the traffic, reserving the question of knowing if the Governments would have the right of using this faculty without giving rise to a claim for indemnity on the part of the Company, etc., etc. . . . The letter concluded by complete approbation of the course that the French Government proposed pursuing.

A year after, however, further progress is made:—

In order to definitely settle the agreement and to complete it on all points, the two Governments created a Commission of six members, three nominated by the French Government, and three by the British Government.*

This Commission closed its work by the drawing up of a protocol signed by the representatives of both countries (May 30th, 1876), and named:—

> "*The project adopted by the International Submarine Railway Commission to be used as a basis for the Treaty to be drawn up between France and Great Britain.*"

This project and treaty, which may in a sense become the Submarine Railway Chart from International law point of view, settles all questions which may arise from the existence of the tunnel in the dealings between the two nations.

It defines the submarine frontier, the legal effects of which will be limited to the tunnel. It also defines the judicial standing of the French and English parties, and makes provision for the operation of a permanent consulting International Commission which will tender its advice on all questions connected with the construction, the upkeep and the operation of the submarine railway. It defines the method of drawing up the rules for its operation. It fixes the conditions for the upkeep of the tunnel. It determines the life of the concession, and gives to each Government the right of redemption. It states the delays with which the work is to be carried out, and foresees the consequences of incompletion through the will of God. It states under what conditions the right of redemption can be exercised, etc., etc.

All the details are, consequently, well taken care of, and it can be safely said that this protocol leaves nothing unsettled.

Furthermore, a truly remarkable clause should be pointed out, which has, nevertheless, been accepted by

*The three French delegates were:—Messrs. C. Gavard C. Kleitz, A. de Lapparent, and those for Great Britain were:—Messrs. H. W. Tyler, C. M. Kennedy, and Horace Watson.

the Companies holding the concessions, and with which everybody should be acquainted, as it will immediately prevent any discussion with regard to the possible dangers created by the tunnel for Great Britain's security.

This clause is as follows:—

The right for each Government when it will be deemed advisable to do so in the nation's interest:—

(1) To stop the operation of the submarine railway, and to prevent passages through the tunnel.

(2) To damage or destroy, totally or partially, the tunnel works of the submarine railway construction on its own territory

(3) To flood the tunnel if necessary; all this, without any obligation for the country taking advantage of this clause to pay an indemnity to the other country, neither to the operating Company of the other country.*

A few words should now be given with regard to the concession contracts of the Companies holding these concessions.

It was on February 1st, 1875, that the French Tunnel Company was formed. It was presided over by Michel Chevalier, and included such men as Lavelly, Fernand, Raoul Duval, Leon Say, etc. . . . with the object of obtaining from the French Government the concession of a submarine line to Great Britain.

The law of August 2nd, 1875, approved the agreement made on the same date by the Minister of Public Works with this Company, and granted it the concession of the line thus defined: "Railway starting at a given point on the Boulogne and Calais line, running under the sea towards a similar line starting from the English coast in the direction of the French shore."

The concession was granted with neither subsidy nor guarantee of interest, on a lease of 99 years from the time of the beginning of the working of the submarine railway, the State binding itself not to concede such right during a period of 30 years, reckoned from the same time, to any other railway starting from the shore, and running under the sea in the direction of England.

The concession was definitely settled and the railway declared of public utility by the Act of Parliament granting the concession.

The Company undertook to declare in the course of from five to eight years if it intended to adhere to the concession. It also bound itself to carry out to the amount of at least two million francs, the preparatory works of all sorts, such as investigations, shafts, galleries, soundings, etc., deemed necessary in order to satisfy the Administration and the Company on the technical points of the undertaking; also the possibility of completing it with reasonable chances of success. Besides that, the concessionaires undertook to enter into relations with an English Company in order to carry out the submarine railway starting from the English shore in the direction of France, so that they might carry out and work in common accord the whole of the international railway.

The French Tunnel Company* has fulfilled all its duties. It has spent more than two million francs on preparatory works, shafts, soundings and galleries; we shall refer to this subject later on. It has also fulfilled conditions, the accomplishment of which have rendered the concession definite. It continues to pay the French Government the fees for control specified in the convention.

All the works and installations it has carried out are preserved in a satisfactory state, so that at any time definite working could be undertaken immediately, if the difficulties and opposition that arose on the English side twenty years ago in such an unexpected manner were removed.

The position is identical on the English side, both from the technical and the administrative points of view.

As in France, the South-Eastern and Chatham Railway Company, which operates the lines connecting London with Dover and Folkestone, obtained on July 16th, 1874, a bill which sanctioned the construction at Dover, at the foot of Shakespear's cliffs, a gallery one-and-a-quarter miles long, about 1,750 yards being under the sea. This gallery was made for an experimental purpose and was similar to the French gallery at Sangatte. Both galleries have been kept in a very good state. The same S.E. & C.R. Company took a part in the formation, on December 8th, 1881, of the Submarine Railway Company, with an initial capital of £250,000, with which the French Submarine Railway Company is in close touch.

It can be conceived how before the deputation of the British Parliament was introduced by Mr. Fell to Mr. Asquith, the distinguished President of the S.E. & C.R. Company, Mr. Bonsor, may have emphatically stated to Mr. Fell that the Submarine Company and his Company were both quite willing to introduce a bill at the next Parliamentary Session if the Government were willing to give them their support.

* Naturally, the Government making use of this right would have to pay an indemnity to the Company to which it would have conceded the right on its own territory.

* NOTE.—The capital of this Company was made up of 400 shares, half of which were taken by the Northern Railway Company of France, one quarter by Messrs. de Rothschild Bros., and one quarter by about 30 persons belonging to important banking or industrial firms, or by a few scientific personalities. The committee representing this Company, and which was never dissolved, is to-day made up in the following way:—*Committee:* MM. Caillaux (Joseph), Demarchy, Griolet (V.-P.), Johnston (Raoul), Leroy-Beaulieu, Mirabaud (Gustave), Raoul-Duval (Maurice), Raoul-Duval (Rene), Sartiaux (Albert), Schneider (Paul), Vernes (Felix). *Sub-Managing Committee:* MM. Griolet (V.-P.), Leroy-Beaulieu, Raoul-Duval (René), Sartiaux (Albert). *Civil Engineer for the Company:* Mr. Bretón.

Scientifically, is the Railway under the Channel Possible?

Technical Account.

From the technical point of view, the construction of a tunnel under the Channel presents problems entirely different to those which had to be solved in building other well-known tunnels under rivers or through mountains. The problem will be at the same time easier and yet more difficult.

It will be easier because the strata to be traversed, if the plan is properly prepared, can be pierced with a large auger like wood with a handbrace; and more difficult as, firstly, the tunnel will have a length of more than 30 miles, and no tunnel of this length has yet been built; and secondly, because it will be necessary to follow the course of the proper strata at the most convenient depth, that is in the lower portion.

From ancient history a few examples of tunnels can be discovered; for instance, the tunnel constructed by the Assyrians under the Euphrates, in order to connect two palaces placed on either side of the river.

Remains of aqueducts are to be found in Carthage, and sewers in Rome. The Romans are known to have bored two tunnels for the construction of roads, one on the Flaminian Way through the Apennines, the other in Switzerland near Soleure.

In the middle ages underground galleries were part of the art of fortification, and they very often attained a length of several miles, but from the point of view of transit, subterranean passages were really only used from the middle of the 19th century. This is natural, as subterranean passages, and in consequence tunnels, which are merely large subterranean passages, only came into existence with the railways.

Previously, mountains were not bored through, and it was necessary to pass over or around them

With regard to ordinary roads used for horse traction, and on which only comparatively small loads are to be hauled, we find that up to the present day these roads are built with severe gradients which may reach one in ten, or even one in seven; also, they are built with curves, the radius of which may be as small as 50 or 65 feet, in such a way that with repeated windings it is possible to circumvent without boring the steepest mountains.

A totally different problem arises when railways are considered; then it is necessary to haul considerable weights which, as in the case of trains running between Paris and Calais, may exceed a load of 400 tons propelled by a single and very powerful motor, which must consequently be very heavy and rigid. It is then only possible to make use of comparatively small gradients, which on lines of heavy traffic do not exceed 1 in 500, and when it is necessary to traverse mountains such as the Simplon, the St. Gothard, etc., for safety, a greater gradient than 2 or 3 in 100 cannot be used.

Furthermore, as curves increase the traction difficulties and prevent high speeds, it is necessary to replace the 50 or 65 radius of the ordinary road by a radius of 800 or 1,000 feet, and this for important lines must be increased to 2,500 or 3,000 feet in order to allow of high speeds.

Given these conditions it will be seen that it is absolutely necessary to pierce the mountains instead of circumventing them, and it was due to this difficulty that the art of the construction of subterranean passages and tunnels received its greatest impetus.

At the present time these are of every-day occurrence. At the start of the century, about 1840, Brunel constructed the first tunnel under the Thames, quickly followed by numerous subterranean passages, necessitated by the rapid extension of the railways. Some of these involved considerable work of a most difficult character, partly on account of their length, but also on account of the special nature of the strata traversed. Chief among these were the Semmering, with a total length of just under 1 mile; the Mount Cenis, 7½ miles; the St. Gothard, 9 miles; the Arlberg, 6 miles; the Simplon, 12 miles; and the Loetschberg, 8 miles long.

After the plan of the tunnel has been made, boring must be started in the given strata, such as it is. This is usually more or less well known, the work being started by boring a small gallery called the "Advance Gallery," behind which the actual passage is enlarged by successive steps until it attains the final section of the tunnel. During this work the most varied difficulties are encountered, often of considerable magnitude, such as unsuitable composition of the strata, the inrush of water, etc., etc.

The problem presented by the Channel Tunnel will be entirely different. In this case the first point to be settled is the placing of the tunnel in a certain strata layer which shall be solid and impermeable, and in which there will be no fear of any infiltration of sea water. It is a well-known fact that there has been in existence for a number of years tunnels of a similar character and of great length built under the sea.

The Cornwall tin and copper mines extend to a considerable distance under the sea without any infiltration, in the coal mines on the Cumberland coast coal is worked in several subterranean galleries extending more than three miles from the shore, and these, together with the transversal galleries used for connecting up the main galleries, make up a total length which is as great as that of the projected Channel Tunnel. The water has never penetrated into these mines, and the miners, well knowing the conditions, boast that some day they will be able to reach the Irish coast, distant about 60 miles, although to do so it would be necessary to bore a tunnel under the sea, the depth of which would be vastly greater than the depth encountered in the Channel.

Practical experience is, however, better than the best comparison, and we now have exact data with regard to the practical possibility of boring the Channel Tunnel.

The geological studies made by the various geologists of the two countries, the numerous drillings and borings which have been made on each side of the Straits, have completely and clearly shown the nature of the soil, and exactly given the composition of each seam and particulars of their connections.

If we go a little further back than the present time we shall be able to form a better idea of the ups and downs to which the Channel Straits were submitted during the various geological periods, and we will then be able to more fully understand their present condition and how it was reached.

The Straits like the world itself presented a very different aspect in the past to that which they now present; they are continually being transformed by a more or less slow action, but sufficiently rapid to be detected.

Careful observation has proved that at the present time they are being eroded to the extent of approximately 65 feet on each side per century—that is, a total of about 130 feet per century.

Originally laid down during a geological period which corresponds to the Cretaceous formation, a formation consisting of a seam of chalk, and in which careful studies prove that the tunnel must be placed, the region covered by the Straits was far different to that which it is to-day. The Cenomanian sea covered all the South-eastern part of England and the North of France to much below Paris and the Mans; only a portion of the Cotentin region and the Wales district were above water, together with the Ardenne and Belgium districts, the level of which has since remained stationary.

After this period, that is considerably after the Cenomanian system, a portion of England was lifted up, and the Lutecian sea which still covered Paris gave birth to a kind of Anglo-French headland, of which the Dover cliffs and the Blanc-Nez cliffs are the witnesses. This transformation went on to the end of the period which corresponds to the Miocenian epoch. The uplifting movement being continued, France and England were joined together by an isthmus washed on one side by the Atlantic, and on the other side by the North Sea, which at that time extended over a large portion of Holland.

This isthmus had the shape of a very wide bridge of considerable magnitude, over which most of the animals of the quaternary system crossed from the continent to the British peninsula.

That is why in England it is possible to find in all the quaternary caves fossil teeth and bones belonging to bears, hyenas, mammoths, rhinoceroses, etc., which usually lived in France; the remains of gerboas and reindeers are also met with, which shows that these animals, essentially land animals, crossed over the Straits on dry land to the peninsula mentioned above.

But a new transformation is in preparation caused by the seas' repeated action. The Atlantic waves on the one hand and those of the North Sea on the other, eroded the isthmus in order to join each other, and the vertical section of the actual cliffs shows their marine origin. It is only at the start of the actual geological period that the transformation phenomena of the isthmus into straits happened gradually and without any jars by a slow action similar to that which is going on under our eyes, with a speed of about 130 feet per century. The "start" of the period does not mean that it was yesterday, as if we suppose that the action proceeded with the same speed which it possesses to-day, the cutting of the Straits into the shape they now possess would have required at least 100 centuries.

It is absolutely impossible to state the time which it has taken, and the most distinguished geologists are not agreed on this point.

In Geology as in Politics there are two parties—the first is made up of the people in a hurry, and the second party of people who believe that the speed of these phenomena must have been very similar to the speed with which they are now proceeding.

The first, named the Plutonians, state that the geological transformations happened in a very short time, namely, a few thousand years. Neptunians cannot see why the eroding agents should have possessed more power then than they possess at the present time.

Whatever the case may be, and should it have happened more or less than 100,000 years ago, it has, nevertheless, been made evident from these geological studies that a direct link existed between France and England, and that this link only disappeared by means of an eroding phenomenon, very slow, which washed away the upper part of the link and left as witnesses the Dover and Blanc-Nez cliffs; but the lower part of the link was maintained underneath the level of the sea, where the strata, connecting the two countries, remain in their original position.

In the actual state of things the Straits between Dover and Calais are crowned with high perpendicular chalk cliffs; on the French side those of the Cape Blanc-Nez, in England those from Dover to Folkestone.

When a study of the geological transformations in these districts is made, it is impossible not to be struck by the complete similarity of the two formations from the point of view of the strata composition, which starts from the Jurassic system at the base ending with Tertiary strata on the top. On both sides the composition of the chalk layer is identical, and on the top part the chalk is white and contains flint; lower down the flint disappears and the chalk mingles with clay; finally, at the base, near Wissant and at Folkestone there is a seam of chalky

clay, very compact and uniform, on which large cement-stone workings have been established. The chalk is sufficiently soft to be easily cut, and sufficiently resisting not to crumble up; the clay which it contains renders it impermeable.

It is impossible to imagine a strata possessing better qualities for boring a tunnel.

Through the presence of these two conclusive witnesses of the geological identity of the French and English strata, it is reasonable to hope that the seams which are to be found on each side of the cliffs extend from one cliff to the other throughout the whole length of the Straits, and to believe that this seam dips in a regular way on both sides, to the North-North-East, meeting in the middle of the Straits.

Although this supposition seems most reasonable, the French Tunnel Company deemed it advisable to make a test, and thanks to the admirable work undertaken on its account by a mission composed of two distinguished geological engineers, MM. Potier and A. de Lapparent, and thanks also to the strength of the tides, which keep the bottom of the Straits in a good condition of cleanliness, undisturbed, except in a few places, by any deposit of sand, mud or shingles, this question has been solved in a most complete way.

In 1876 and 1877 MM. Potier and A. de Lapparent took more than 7,000 soundings in the Straits, not only ordinary soundings for discovering the depth of the water, but also by means of a sharp-angled tube charged with a sufficiently heavy weight, so that in falling to the bottom of the sea the tube was enabled to bring away a sample of it, in other words, a core, two or three inches long, sufficient in most cases to allow of geologically identifying the ground from which the sample had been obtained.

Thanks to these soundings, 3,000 of which are geologically accurate, MM. Potier and A. de Lapparent have been able to continue the geological chart under the Straits with a precision almost as great as their English and French colleagues had displayed in making geological maps of English and French soil. The lines marked on these charts, showing the separation limits of the different varieties of ground, are found to be continuous without any flaw or break right across the Straits. The consecutive order of the strata is reproduced throughout; even the depth of the different seams met with is shown to be relatively constant. In a word, all the stated facts only confirm the supposition that the Straits have been hollowed at a comparatively recent period, and going back to the beginning of the present geological epoch were caused by powerful erosions and not by a breaking up of the ground.

Now it has been proved that amongst the geological strata is one, the Cenomanian, commonly called the Grey Chalk of Rouen (*craie grise de Rouen*) which seems particularly suitable for the passage of the tunnel on account of its homogeneity, complete absence of cracks, perfect impermeability, and firmness that would allow of comparatively easy working. It is this stratum, averaging a depth of about 200 feet, that the geological studies as they progressed, have shown more and more clearly to be the best in every way for the proposed works. It was in it that the direct experiment of submarine boring was tried and continued until March, 1883, by the French Company under the direction of the eminent director of works, M. L. Breton, who is equally well-known as a geologist and as a mining engineer, and from whom it can be said that the geological formation in the region of Boulogne holds no secret.

The direct experiments in this layer consisted in sinking on the shore at Sangatte a shaft of large diameter to the depth of about 200 feet below sea level, and in starting from the bottom of this shaft a gallery to be used for experimental purposes 7 feet in diameter, penetrating the before-mentioned seam of Cenomanian chalk for a distance of 1 mile 250 yards under the sea.

The great importance of these works is not sufficiently well-known. Even at the present time there is at Sangatte some fairly extensive works in a very good state, including two steam engines of 300 h.-p., several powerful suction pumps and air compressors, shaft and cage, etc. It is by means of these works, looked after with religious zeal, that the experimental gallery was bored out, by which it was possible to prove, on the one hand, the almost perfect impermeability of the seam, and on the other the possibility of continuing the boring by means of the drilling machine invented by Colonel Beaumont, with a gradual increase of speed up to 1,300 feet per month. It would have been possible even with this machine to exceed this figure, and now with drills provided with the more recent improvements an even greater speed could be attained.

Added to this, the conscientious studies made by M. L. Breton since 1879, more than 25 years ago, in the region of Boulogne, and in Kent, still further confirm these results. They have proved that the seams of chalk exist without dislocation or out-throw, and have revealed largely curved bends without a break.

This opinion is confirmed by the highly interesting and very remarkable investigations of MM. Barrois, Olry, Gust, Dollfus, Gosselet, and others.

It is also a very definite opinion of the English geologists, Messrs. Prestwich, Topley, Jukes Browne, and also of one of the most illustrious among these, Sir Archibald Geikie, the learned Director of the Geological Map of Great Britain, who said when examining the relief plan of the Straits which the French Tunnel Company had sent to the Ghent Exhibition that he considered as sure to come true the previsions made in 1876 and 1877 by MM. Potier and de Lapparent, and that it was possible to consider as a fact the regular presence under the Straits of a uniform thickness of about 200 feet of a

seam of grey chalk, hard and impermeable, in which the tunnel could be built without any difficulty.

Given these conditions it is possible to state that the scheme of boring the tunnel will consist in starting from each of the cliffs at Blanc-Nez and Dover, from a point located on the open ground above the sea level at the termination of the seam of grey and impermeable chalk. To follow this seam in its dipping and in its various windings, the problem would really consist in not getting out of this seam, and to remain at a sufficient distance from the top and bottom surfaces, and also not getting too close, above or below, to permeable strata, which might allow the infiltration of water into the tunnel, thereby impeding the construction, and also the future operation.

When the first plans of the tunnel were made towards 1880, the problem of remaining in this seam was not solved without some lack of certainty in the results.

In order to be able to make use of the tunnel for the passage at very high speed of heavy trains, it was necessary, with the traction methods known at that time, *i.e.*, superheated steam traction, to adopt very small gradients, and curves of very large radius, which considerably increased the difficulty caused by the necessity of remaining in the seam of hard and impermeable grey chalk. The advent of electric traction—which enabled the same power and speed to be obtained with a radius which can be as small as 800 or 1,000 feet, with gradients as low as 1 in 100 or 1 in 75—renders the problem infinitely easier, and it is now evident that there is not the slightest doubt that the tunnel can be constructed to follow the deflections which must be made in order to continue in the said chalk seam.

It is therefore possible to consider as a certainty that there exists between France and England a seam of hard chalk of sufficient thickness, impermeable and without faults, in which it will be possible to place the tunnel without any fear of inundation. It is also a certainty that owing to the nature of the ground the boring will be easy, far easier in fact than was the case when boring the tunnels of the St. Gothard, Simplon and Mount Cenis. It is evident that the only real difficulties which will be encountered during the tunnel's construction mainly consist, especially at the start, in drafting the route to be followed by the tunnel so as to keep it in the layer where it must be placed, and also in commencing the heading which will form the tunnel, and in bringing out the excavations rapidly and at a low cost.

Let us briefly sum up the means which should be employed for attaining this result.

It will first be necessary to determine the longitudinal section of the tunnel. The tunnel could start from a point on the coast which would be above the sea level, and will then dip towards the centre of the Straits, so that the depth at the lowest point will be about 328 feet below sea level.* The profile which would be obtained by this method might possess some serious drawbacks if, notwithstanding that the seam is impermeable, infiltration should take place.

Water would then accumulate in the middle of the Straits, and it would be exceedingly difficult to get rid of, even with the most modern pumps.

In order to obviate this drawback, the suggestion of M. Breton for an independent draining gallery should be adopted. This draining gallery would start from the coast at a low level, namely, about 400 feet below sea level, and would ascend up to the middle of the Straits where it would meet the tunnel itself. Water would naturally flow into this gallery, and would accumulate at the bottom of the shaft or shafts sunk near the coast, where it would be expelled by means of powerful pumps fixed at the bottom of the shaft.

The draining gallery on one side, the tunnel gallery on the other side, which meet towards the middle of the Straits, would diverge from each horizontally and vertically, step by step, as the coast was reached, the gallery dipping while the tunnel would be ascending, and owing to the general slope of the seam towards the North, the gallery would incline towards the North, while the tunnel would, on the contrary, incline towards the South.

This draining gallery would, on the other hand, possess numerous other advantages :—

Not only would it serve to drain off all the water when the tunnel is in use, but it will also possess two other advantages which may be still more important : that of enabling the tunnel to be planned out with the utmost certainty, and of allowing it to be built with the minimum delay and the maximum facilities.

We know for a fact that the special seams of grey chalk exist and possess a sufficient thickness, but we do not know with absolute certainty the position of the underground strata ; the drainage gallery would have, amongst other advantages, that of allowing it to be tested. As concerns the choice of location for the boring of the shafts in the ground, the facilities required for this boring should first be taken into consideration. The difficulty will be to avoid as much as possible the superficial sand bed on which the village of Sangatte rests. These shafts should be bored to the bottom of the grey chalk ; then the thickness of the chalk should be ascertained at the chosen boring points. The boring should then go on according to the theoretical direction of the draining gallery, and as soon as 350 or 500 feet of gallery have been made, *i.e.*, after about one week's work, a boring above and below should be made in the

*Translator's note.—The maximum sea depth on the path of the tunnel is 180 feet, so that there would be a minimum thickness of about 150 feet of solid ground between the bottom of the sea and the top of the tunnel.

chalk in order to ascertain the exact position of the gallery in the bed. A week later similar borings should be made and repeated, once in every eight days, that is to say, about every 500 to 650 feet. When any of these consecutive borings show that the gallery is getting too near to either the upper or lower limits of the chalk bed, indicating that the bed has not the exact formation hypothetically attributed to it, the alignment would have to be modified accordingly without altering the theoretical section, in order to come back to the general position which it is important to keep. The drainage gallery would thus become more or less sinuous. But this is of little importance as it would not hinder the flow of water.

Before work is started in the main tunnels, the nature of the strata through which they will have to be driven will thus have been ascertained. Observation can be further continued by means of the cross galleries which, as the drainage tunnel progresses, will be driven to meet the proposed line of the main tunnel, giving by means of successive tests at intermediate points definite information for placing the tunnels at the correct depth.

These cross galleries, starting from the drainage tunnel and extending to the centre line of the main tunnel, will enable work to be carried on at as many working points as there are cross galleries. The work must naturally always proceed on the upgrade in order to prevent danger to the workmen in the event of a possible inrush of water.

The number of these cross galleries would vary according to the required speed of boring in the tunnel, a smaller number being necessary if the speed in the drainage tunnel be increased, but whatever the number may be, it is evident that through their very existence in conjunction with a drainage tunnel, it will be possible not only to trace out the lay of the main tunnels with certainty, but also to dispose of quickly and easily the material excavated in boring the main tunnels.

A small double track electric railway would be installed in the cross galleries and drainage tunnel.

The railway would have a 2-foot gauge and be used for removing the excavated material from the main tunnels and delivering it through the cross galleries and the drainage tunnel to the bottom of a shaft where it would be hauled to the surface by means of elevating machinery.

The organisation of these transports will be very important and interesting, as it will be necessary to carry away not less than 4,000 tons of *débris* per day, representing about 100 trains per day in each direction, added to the conveyance of at least 1,200 people corresponding to the return journeys of the workmen and staff from the several working points. This staff will be divided in three, more probably four shifts, so as to secure the continuity of the work; 1,200 people and 4,000 tons of excavated material per day, covering an average distance of 6¼ miles, represent a traffic which many railways of local or even general interest would envy.

Thus, thanks to the scientific progress made in the last twenty years, improvements in boring machinery, the utilisation of electric traction for the removal of the excavated material, the use of electrically driven high-speed pumps for expelling the infiltrated water collected at the shaft sumps, thanks also to minor progress such as the telephone and electric light, the boring of the tunnel and draining gallery will not take more than from four-and-a-half to five years after the completion of the auxiliary and preliminary works, the most important of which will be the laying of tracks to carry away the excavated material and the sinking of large diameter shafts similar to colliery shafts.

It is certain that the sinking of the shafts will be one of the greatest difficulties to be overcome by the engineers superintending these works.

It will, however, be possible to obviate these difficulties by using similar methods to those successfully employed by M. Breton for sinking the two shafts on the western boundary. It will be possible, as foreseen by M. Breton, to have recourse to congelation, and perhaps to cementation. Those borings will not be very expensive, since they will not require more than from £40,000 to £80,000, but they will take a long time, probably not less than two years.

It is hardly necessary to point out that on the English side the work will be carried out in exactly the same way. The conferences held on this subject with the renowned English Engineer, Sir Douglas Fox, who built the Mersey Tunnel and several of the Metropolitan London tubes, and who possesses a thorough knowledge of the tunnel question, showed that his intention was to adopt on the English side the methods which were going to be used on the French side, and which offered the best guarantee for the final success.

To complete the particulars given on the tunnel construction, it is necessary to state what will be the section of the tunnel, and also how it will be connected to the existing line.

We have stated that the drainage gallery will have a circular section about 10 feet in diameter. The tunnel itself will be built on similar lines to the London electric "Tubes" with two parallel circular galleries, each 18 feet to 20 feet in diameter, placed at a distance of about 50 feet from each other, and consequently not re-acting on each other from the point of view of the resistance of the seam, and bringing to this seam the minimum dislocation possible, as the circular section is one which offers most resistance to pressure, both interior and exterior. This circular section is, moreover, rendered necessary by the nature of the boring machines which perform their work in a circular way.

Regarding junction lines, recent studies have shown that the route sketched out in 1881 could be notably

improved. Owing to the new point chosen for entering the tunnel, a little to the south of Cran d'Escalles, the junction will branch off at Beuvrequent, pass very near Marquise, and end almost on a straight line at Wissant, a pretty little village about half-way between Cape Grisnez and Cape Blanc-Nez, well-known by all painters and especially to Jules Breton (brother of the Engineer to the French Tunnel Company).

Here Cæsar established a camp before sailing for England, and at this point the Custom House Office and goods station would be built, and the changing of the engines take place, the electric locomotive proceeding to the siding, a steam engine for hauling the train to Paris being simply attached to the rear, which thus becomes the front without shunting or loss of time.

The part of the line in the open will not be of a difficult or expensive character, except the viaduct, which will precede the entrance to the tunnel and which will be constructed if, through a misconception, the military fears* still exist which caused Lord Wolseley to insist that it should be established, so as to be within reach of the guns of the fleet commanding the Straits.

That part would have a length of 8¾ miles only, with gradients not exceeding 1 in 160. So that, in the direction of Paris, the long gradients of 1 in 125 which now exist on the line from Boulogne to Calais, beginning at the gradient of Caffiers, would not be met with.

For the communications with Belgium and Germany, a connection made between the new line and the line running from Boulogne to Calais, would allow the trains to run directly in the northern direction as soon as they come out of the tunnel.

On the English side similar dispositions would be realised, and would consequently allow the direct passage of trains between the two countries, not only between Paris and London, but also between all parts of Europe and Great Britain. The English track gauge is within a few millimetres, roughly $\frac{1}{16}$", the same as that of the Continental tracks. Some of the rolling stock will have to be specialised, as a small difference exists in the width of the engines and carriages, the same being larger than that used in England; exchanges will be rendered possible between England and Europe, as they are now made between the various countries on the Continent, with the exception of Russia and Spain, which have adopted wider track gauges than the standard.

We must now show briefly what will be the cost of construction. The expense involved by the tunnel construction has been estimated at very different figures; about 30 years ago, after the first studies had been made, the figure for the total cost was very small. A French engineer, M. Bergeron, named £5,000,000. A well-known engineer, Mr. John Hawshaw, put the figure at £10,000,000. According to the more recent studies, these figures are too low, and at any rate, in order to be on the safe side, it is advisable to reckon on a much greater expenditure.

The English engineers, amongst whom was Sir Douglas Fox, estimated the expense for the English portion, about half of the tunnel, would be £6,000,000, and they finally increased this to £6,500,000.

Some contractors from the U.S.A. feel confident that with their methods they could build the tunnel for a lump sum far smaller than the one stated above.

The investigations made on the French side lead to the belief that the sum of £7,250,000 would be a reasonable figure, but in order to allow for all unforeseen items likely to arise during the construction, etc., it has been deemed advisable to fix the cost for the French part at £8,000,000. Allowing for similar unforeseen and accessory expenditure on the English side will bring up the total expenditure to about £16,000,000.

The distance between the stations is 32 miles, and the tunnel proper having a length of 29 miles, this is, consequently, an expenditure of roughly £550,000 per mile, which may seem a high figure, but in work of this nature it is far better to be agreeably surprised than otherwise.

It is, however, difficult to compare these figures with those relating to tunnels constructed under entirely different conditions. The large tunnel, 2.4 miles long,

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* We do not wish to insist on the futility of the invasion risk, which without any foundation twenty years ago, has now become absolutely chimerical. The enemy which was feared by Lord Wolseley has become the friend, and with the present state of affairs in Europe there is nothing to prevent the *Entente cordiale* from lasting. But even if this were not so, is it possible to believe that a long passage such as the tunnel, without any spare tracks at the arrival station and without any unloading platforms, could allow a passage of an army corps of some importance, including not only men but material. Is it possible to suppose that by a wild rush a small group of men, even ever so determined, could capture the three forts, which at 3,000 feet, 5,000 feet and 10,000 feet, could be built above the tunnel entrance which has been placed at the bottom of a small valley, above which the three forts hem it in. Finally, as the tunnel when finished will have a length of approximately 32 miles, steam locomotives cannot be employed, as these would exhaust the air; electric power will be employed supplied from two Power Stations. The English Power Station would supply current to the trains from France, and *vice versâ*, the French Power Station would feed the trains coming from England. By simply cutting the feeding cable, traction would become impossible, and this alone would be ample to sufficiently prevent the enemy penetrating into England, or to get as far as the tunnel's head, then to conquer Dover and its forts, and to establish itself in order to invade England.

If the above points are kept in mind, and how varied and powerful are the means by which it is possible to prevent access to the tunnel, how completely impossible it would be to bring into England even a small number of men without risking their immediate annihilation, it will be seen from the opinion expressed by the well-known Field Marshal De Moltke that the tunnel should not be built as it could not be used to attack England, but would be very detrimental to Germany in case of war.

which connects the Valhubert Square to the Orsay Station in Paris, was built at a considerably less cost, as it did not exceed £200,000. The cost of the Metropolitan Railway in Paris varied between £100,000 and £135,000 per mile; the Metropolitan Viaduct cost about £270,000. The St. Gothard, Simplon, and other tunnels did not reach such a high figure, but it is necessary to point out that in these cases the conditions were absolutely different.

It is almost certain that in the boring of the submarine tunnel such considerable difficulties, and even dangers, will not be met with as those encountered in the boring of tunnels such as the Simplon. It will not be necessary to deal with workings flooded by tremendous inrushes of water or with excessive temperatures which caused discomfort to the workmen and endangered their health. The ground encountered will be homogeneous, easy to bore, and more regular, such conditions favouring a more economical construction of the tunnel. On the other hand, it will be necessary to bore a tunnel of considerably greater length, and unusual difficulties will have to be surmounted in order to properly remove the larger quantity of excavations.

If, as stated, the seams are more homogeneous, more impermeable and easier to bore through with a uniform temperature of 4 or 5 degrees above zero Centigrade, on the other hand it will be necessary on each side of the middle of the Straits to remove at least 21,400,000 cubic feet of excavations which will have to be carried to a distance of at least six miles, and then lifted from the bottom of the shaft by means of bucket dredgers so as to keep the workings clear.

Finally, the various drillings and sinkings which it will be necessary to carry out in order to ascertain the ground and remain in the impermeable seam will entail work which will be fairly expensive.

It is very probable that the cost, unless the unforeseen happens, will not reach the figure of £16,000,000 which was previously fixed, but as before stated, it was thought wise to make provision against any disagreeable surprise.

Having described the method according to which the tunnel should be planned out, and according to which it should be built from the technical point of view, a few words may be added on the methods best suitable for its operation. As stated, electric traction will be used between the two common stations belonging to the Tunnel Company and the land Railway Companies, Dover (or Macton, near Dover) on the English side, Wissant on the French side. With reference to the kind of current to be employed, whether single, two or three-phase, the experiments which are now being carried out all over the world will surely demonstrate the one best suited to propel the trains in the tunnel. At the present time it can be stated that through passenger trains, weighing 400 tons or more, between Europe and Great Britain will be drawn by powerful electric locomotives, of sufficient power to haul a train from one end of the tunnel to the other (approximately 32 miles) in 40 minutes, or 1 hour 20 minutes to 1 hour 30 minutes for goods trains weighing 800 to 900 tons.

If the Customs do not cause delay, the time taken for the passage between London and Paris will be about 5½ hours, sufficient to allow going and returning from Paris to London on the same day, attending to business in London or in Paris in the afternoon, as it is commonly done nowadays between Paris and large towns on the Northern Railway and even Ghent, Brussels and Liege, the inhabitants of which can come and spend an afternoon (or *vice versa*) and return the same evening at an hour well within the habits of ordinary life.

This will not be the only progress caused by the opening of the tunnel. At the present time the 22 trains which bring passengers to Boulogne or Calais, and which take them away, are scheduled at times which enable the passengers to be conveyed by six boats only. The cost of these boats, the expense of an ordinary crossing exceeding £100, is so very great that it is necessary to reduce as much as possible the number of these crossings, and consequently the present day habit is to make the arrival and departure coincide with the trains from Paris, the "*Côte d'Argent*" or the "*Côte d'Azur*" from Switzerland, Italy, Belgium and Germany, and to select times which are not always very convenient, and which lengthen the total time of the journey. With the tunnel, trains from all directions will proceed with the same rolling stock, without stopping, except for the change of locomotive or for the Customs inspection. This will be a considerable progress from the public's point of view. It is possible to foresee that if the tunnel is completed in 8 to 10 years, all the traffic could be taken care of by about 50 trains per day, with receipts amounting to about £2,000,000. The double track tunnel will possess the character of a transit railway, without intermediate local traffic, and will be able to deal with a 400 or 500% increase without any difficulty, and with comparatively very low operating expenses, no part of the traffic being diverted during the transit, and all the traffic being for the full distance, and accordingly paying the tax corresponding to the total length of the line. It is quite possible to foresee the carrying of 10,000,000 passengers, and as many tons of goods, and it will not be necessary to overcome technical difficulties such as the proper distribution of the rolling stock and the full use of the various tracks such as are met with on railways like the Northern Railway, especially near its Paris terminus.

Economics of the Channel Tunnel.

For many people the main object of the Channel Tunnel will be the prevention of sea-sickness—and this is surely something.

A few years ago *Punch* published a cartoon showing

Britannia and Father Neptune, and entitled "Hands beneath the Sea." Father Neptune said:

"Look here, madam, I've been your protector all these years, and now I hear you think of undermining my power."

And Britannia, who was holding in her hand a trident, "The World's Sceptre," replied:—

"Well, the fact is I want to see more of my friends over there, and I never look my best when I've been sea-sick."

This was really a similar idea to the one expressed by Her Majesty Queen Victoria, who one day replying to somebody who had mentioned the project of the Channel Tunnel, "You can tell the French Engineer that if he succeeds in doing this I will give him my blessing personally, and also in the name of all the ladies in England." If the tunnel has one result, that of abolishing sea-sickness, it will also have the far more important result of increasing in considerable proportions the relations which exist not only between England and France, but also between Great Britain and the rest of Europe.

The large tunnels, such as those of Semmering, Mount Cenis, St. Gothard, etc., had for their bases an economic idea of far greater magnitude than the ordinary tunnels. The object was then not only to allow a railway to get through in a more or less economical way, some natural obstacles, but also to create relations between two countries which had not existed previously. When the Semmering was built in 1850 its object was to connect Italy and Austria; when the Mount Cenis was built about 1870, the main object was to connect France and Italy, and to facilitate exchanges between France and Italy which only previously existed on a small scale. When the St. Gothard was boring through, the object was not to create competition with the Mount Cenis, but to create relations between Italy and Northern Germany in a similar way as the Mount Cenis had brought into contact Italy and France. The Simplon and the Loetschberg Tunnels possessed an economic bearing less considerable, and their main object is to increase the local and very interesting relations and also to compete with the existing railways.

The Channel Tunnel has a much higher ideal, although similar to that possessed by the Mount Cenis and the St. Gothard Tunnels, as its object is not only to facilitate relations of two countries such as France and Italy, or like Italy and Northern Germany, but to connect Great Britain with the whole of Europe. It is a work which by its great magnitude and its great economic importance can only be compared to the greatest works in the world, such as the Suez Canal. With regard to France and Great Britain alone the *Entente cordiale* which has been established is a Godsend for the peace of the world. The great events which have happened in recent years have clearly shown the superior interest which there is for France and Great Britain to remain on good terms and with full confidence in each other. Politics which have been successful in suppressing all causes for distrust, or for conflicts, have also clearly shown the advantages which would accrue to both countries from an understanding which would maintain the equilibrium between the forces of Europe, and prevent its being broken for the benefit of any of them. If, from the political point of view, it has been shown what the benefits of the understanding could be, it has been very far from bestowing on the two countries the wealth which one could reasonably expect. Let us examine briefly and successively what has been the passenger and goods traffic.

Passengers.

With the present state of things the number of passengers in 1912 between France and Great Britain was only by all routes 1,100,000. The very slow increase which existed before the *Entente cordiale* has since been accelerated, but the figure still seems very low if it is compared to about 6,000,000 passengers between France and Belgium, Northern Germany and Russia. If we examine the relations between England and Europe, we find that among 160,000,000 inhabitants which make up the nations in mind, only 1,700,000 passengers travelled in 1912 between Great Britain and the principal ports of the North Sea, the Channel, and the Baltic.

The ratio between the number of passengers and the total number of the population is only about 1 per cent.; it is nearly four times greater between France, Belgium, Holland and Germany. In this country, that is in all Great Britain, each Britisher travels about 30 times per year.

On the other hand, with regard to Britishers going over to Europe, if we suppose that all the travellers are Britishers, there is only one traveller in 30 inhabitants. The Britisher may go out of his island a little oftener than when only the bridge which formed the isthmus of the quarternary period existed, but the figure itself is quite sufficient to show how isolated he is from the Continent, and the evident cause for this is the barrier which the sea created at the time of the geological commotion. As soon as this barrier has been suppressed, and as soon as it is possible to go from London to Europe with the same facility as between France and Belgium, Holland and Germany, the number of passengers will increase in considerable proportions, and this increase will most likely correspond to three or four times the present number and the commercial transactions will follow a similar progression.

With regard to goods, the commerce between Great Britain and France makes very slow progress; this fact was recently proved by a well-known economist, M. Yves Guyot, who has drawn up comparative figures for the commerce between France and England for the last

30 years. These have been confirmed by the Customs statistics From 1904 to 1911, the last year for which results were published by the Customs manager, the general commerce between France and England grew from £89,000,000 to £117,000,000, showing a progression of 30 in 100, or an average of 4.2 per cent. per year.

During this same period the commerce of France with Germany progressed from £47,000,000 to £81,500,000, that is an increase of 60 per cent., or an average of 8.5 per cent. per year.*

These figures clearly show that facility in communication has the beneficial influence of increasing commerce, and nevertheless, as our eminent Ambassador in London, M. Paul Cambon remarked: "Nature has made some magnificent gifts, but of very various kinds, to both France and Great Britain; their soil does not possess the same qualities, they do not have similar productions, they do not possess the same climate, and they can complete each other by taking from one another what is missing to each."

It may be added that this is caused by the two countries being on the same meridian and that to go from one to the other it is necessary to go from North to South or from South to North, instead of going from East to West, or from West to East. As M. Cambon stated, "Nature works in almost an automatic way to help our exchanges, and notwithstanding this, we find, from the double point of view of the passengers and goods, the exchanges are far below what they should be between two countries so wealthy, so intelligent, and, if I can use such an expression, so complementary."

POLITICAL CONSEQUENCES OF THE TUNNEL.

We only have a few words to add with regard to the consequences the completion of the tunnel would have from the political and military points of view. From this double point of view it does not seem as if the Island and Isolation principles could be much longer opposed to the construction of the tunnel. The following is the extract of an article written by the well-known M. Paul Leroy Beaulieu, in the *Economiste Français*, dated August 30th, 1913:—

> "Some new facts have arisen which are favourable to the tunnel; the first is the rapid progress of aviation which gradually and every day takes away the Island quality, and also decreases the splendid isolation of Great Britain.
>
> "The other fact which is not absolutely novel, but which has considerably increased in importance during the last 20 or 30 years, is the tremendous danger to which Great Britain would be submitted in case of war. She might be deprived of all her food supplies, and even be absolutely and literally starved. A comparatively small number of very determined corsairs could destroy, or at any rate considerably hamper the merchant vessels which bring to England its daily food, without which she cannot possibly exist."

With an ever increasing population which now reaches 45,365,599 inhabitants on a total area less than three-fifths of the French territory, that is, 111,567 square miles, the United Kingdom has to feed twice as many inhabitants per square mile as France, and cannot directly produce the necessary food; it is necessary for Great Britain to secure some of the food stuffs from other parts of the world by means of exchange, all the more so as the British race consumes a far greater amount than the French race. This is why Great Britain has to make a very large amount of imports. Thus, according to the Stateman's Year Book of 1912, the imports of food stuffs in 1911 were approximately:—

	cwts.
Corn or flour	118,628,696
Maize	38,239,307
Rice	8,161,253
Butter	4,267,195
Cheese	2,391,770
Beef (fresh or frozen)	9,300,000
Mutton	5,400,000
Ham or bacon	4,300,000
Other meats	3,000,000
Potatoes, etc.	3,000,000

It will consequently be seen that Great Britain has to import about 10,000,000 tons of food stuffs regularly from abroad, without which she would run the risk of being starved in an exactly similar way as Paris was starved during the years of 1870-1871. The greatest risk to which Great Britain is exposed in the case of war is evidently the stoppage in the influx of food stuffs, of which she requires an enormous quantity. The Channel Tunnel would do away with this tremendous risk. Food stuffs would be brought through the tunnel; even if we were to suppose that France were engaged in a similar war as Great Britain, nevertheless France would always have free connections with the exterior, if not through Germany and Italy, which belong to the Triple Alliance, at any rate through Belgium and especially through Switzerland, which is a neutral country, and more especially still through Spain, with which there are, or will be, three railway lines, one of which is very central.

On the other hand, if circumstances made it necessary for Great Britain to send, as was the case 100 years ago, a military expedition to the Continent, either to protect some threatened independent nation, or to help an ally to maintain the European equilibrium, this expeditionary

* It may be useful to know that of the 12,543,000 tons of goods exchanged in 1911 between France and England, there were 10,152,000 tons of coal which will always follow the maritime route and only 2,500,000 tons of goods which can be diverted towards the tunnel route. This shows that through lack of convenient ways of communication only what is strictly necessary is taken.

force could be transported without any risk and without taking up a part of the Navy to protect the transports.

Finally, if, as Sir Arthur Conan Doyle remarked in a most interesting and very noted article published in the *Fortnightly Review* :—

> "Should anything so unlikely as a raid occur, and the forces in the country seem unable to cope with it, a Franco-British reinforcement can be rushed through from the Continent. The Germans have made great works like the Kiel Canal in anticipation of war. Our answer must be the Channel Tunnel, linking us closer to our ally."

From the double military and political point of view the Channel Tunnel is a national work of security, and at the same time would have a valuable political influence on the European Concert. We must consequently hope that Great Britain will not delay too long her adhesion to this wonderful work, which would have considerable commercial, economical, military and political consequences. Isolation is no more suited to nations than to individuals. Nations have a great necessity to know each other, to compare each other and to mingle with one another.

This is the best guarantee they have of increasing their wealth and intelligence, and we may also add of increasing their pacific sentiments.

The French Premier Welcomes the Channel Tunnel.

M. Louis Barthou, the French Prime Minister, is an enthusiastic supporter of the Channel Tunnel Scheme. Seen by a correspondent of the *New York Herald* in Paris, on 15th July, 1913, M. Barthou said :—

"I know of the campaign conducted by the *Herald* on this very interesting question. Any fine or useful scheme, of course, always has the support of the *Herald*. A favourable solution of the problem probably will be reached in the near future. Conditions have changed, and the objections raised in England are disappearing one by one. Those that are still put forward seem to be more sentimental than anything else.

"Such reasons are doubtless very laudable, but they cannot prevail for ever against the countless advantages of more rapid and direct communication between England and the Continent. And particularly so at a period when in all spheres of life the need of intercourse and exchange between countries grows daily greater. There is no nation which can ignore this need without great danger to its most vital forces. And I doubt if any of the eminent statesmen who preside over the destinies of England are to-day champions of the doctrine of isolation. This may have had its hour, but it no longer answers to the conditions, interests or ideas of the present time.

"For our part, here in France, the Channel Tunnel scheme has never met with anything but support. This even at a period when our relations with England were far from being as cordial and intimate as they have become, as was so eloquently shown by the President's visit to London.

"It, therefore, goes without saying that we can only be warm supporters of a scheme which would tighten our bonds of mutual friendship, and at the same time bring to both nations a considerable increase in trade and a consequent increase in wealth.

"But these material advantages are also moral advantages, since any work which brings to the peoples of the world greater facilities to come together, to study each other and to know each other better is the work of peace and of civilization."

Mr. Gladstone and the Channel Tunnel.

The late Mr. W. E. GLADSTONE, like the Marquess of Salisbury, was a strong believer in the proposed Channel Tunnel, and when Sir Edward Watkin moved in the House of Commons the second reading of the Channel Tunnel (Experimental Works) Bill, on Wednesday, 5th June, 1890,

Mr. GLADSTONE said:—

I shall be sorry if the right hon. gentleman (Sir M. Hicks-Beach) and the Government should be disposed to complain of my contributing to the prolongation of a debate which they think unnecessary, and against which they urge the rejection of this Bill by the House of Commons on four previous occasions. The right. hon. gentleman will recollect that he has himself to blame for imposing on me that necessity, because he has found it needful, for the purposes of his own argument, to refer to what he considers, or his friends consider, inconsistency on my part, in respect to this important question. The right hon. gentleman and every speaker on the Front Bench know that there are certain subjects on which they are perfectly safe in making references to me. Any references to my inconsistency, or to my capacity to express myself in the English language are certain to draw forth cheers from the forces marshalled on the Ministerial benches. I only refer to this matter of consistency because it almost makes it necessary for me to mention that on all occasions I have held that this plan or project ought not to be opposed; and, further than that, I here deemed opposition to it on the merits, and particularly on the score of danger, to be not only unnecessary, not only unwarrantable, but even, if I may so speak, ridiculous. It must not be supposed that I am claiming any credit to myself as a friend of this undertaking. I have never given to this undertaking any further support than justice and honesty demanded on its behalf in the House of Commons. Beyond this, I have given to it no sort of countenance or patronage further than that of having travelled in a special train, not at my own expense, to the Tunnel works some years ago, and having been hospitably entertained and partaken of excellent champagne at the English end of the proposed Tunnel. With regard to the champagne, so far as my recollection goes, that kind of countenance was very liberally and largely conceded to this project by gentlemen sitting on the other side of the House.

I admit, as the right hon. gentleman stated, that the Government of which I was a member voted against a Channel Tunnel Bill. My right hon. friend the Member for W. Birmingham (Mr. J. Chamberlain) on that occasion expressed the mind of the Government, but there was not a word spoken on behalf of the Government adverse to the principle of a Tunnel. Undoubtedly this is not a Party question, and there are some who have changed their minds upon it, including one or two of my oldest, best and nearest friends. At the time referred to, the Government then in office found themselves in extreme difficulties in carrying on public business, and they thought, rightly or wrongly, that these difficulties were mainly owing to systematic obstruction carried on in the main by the Party to which the right hon. gentleman belongs. On that account we felt we could not give up the time necessary for the consideration of a question of this kind. The right hon. gentleman is right in speaking and voting against this Bill if he believes the plan is a bad plan, and if he thinks it is impossible for the Government to be neutral upon this question. We considered at the time it was not compatible with our duty to press forward an important Bill which would have required that extraordinary facilities should be provided for the discussion of the subject. I claim no credit as an active promoter of this project. The warmth of my promotion consists simply in the warmth of disapproval and condemnation of the arguments of opponents.

The right hon. gentleman says there has been unanimity on the part of all the highest Parliamentary, scientific, and military authorities in condemning this plan. I do not know where he draws his line. This is a line by which, together with most of my hon. friends sitting near me, I am entirely excluded as not being entitled to give any opinion of weight on a question of this kind. The right hon. gentleman and his friends alone are entitled to reckon among the highest Parliamentary authorities. We have no title to be heard, though one of us at least was serving his country in Parliament before the human race was enriched by the birth of the righ hon. gentleman. I have no objection to that line of defence; but it should be understood that when the right hon. gentleman speaks of the highest authorities of any kind, it means those who agree with him and entertain his opinions. I think the best argument of the right hon. gentleman was that this Bill had been four times rejected by the House of Commons. But it would be very difficult to mention any great and important project of law, whether in this region of public works or in any other region, that is now upon the Statute Book, and that now forms a valuable part of the commercial arrangements or political liberties of the people, with respect to which it may not be stated that it was rejected four times or more than four times. Notwithstanding, I admit that the argument is not without force. But permit me to observe that it is quite fair on my part to allege that there is a counter argument, which is this:

My hon. friend the Member for Hythe, Lord Stalbridge, and others who have been concerned in projects of this kind, prosecuted those projects anterior to the present state of feeling, and with the universal favour of the country. We may here retort the epithet of the right hon. gentleman. The first proposal I heard for a Channel Tunnel was that of Mr. Ward Hunt, a most distinguished member of the Party opposite, who waited upon me when I was Chancellor of the Exchequer, during the time of Lord Palmerston's Government, as head of a deputation proceeding from the main promoters of the Tunnel. I quote him, but it is useless to quote individuals. I know of one single exception, and with that exception I do not believe that the name of a man can be quoted among the highest authorities, the middling authorities or the lowest authorities, who at that time raised his voice against the Channel Tunnel. The right hon. gentleman says that the Government of Lord Beaconsfield did nothing to pledge themselves to the Channel Tunnel. The question is, did the Government pursue a course of action which pledged that Government? Most certainly they did. They appointed Commissioners to communicate with the French Government upon the subject, to examine and enquire into all the details of an International proceeding. I do not say that it amounted to an engagement, but it amounted to the expectation of an engagement, and a just expectation. I may

also add that whilst I think that our position in respect to the Government of France on this question of the Channel Tunnel is a humiliating position, on the other hand, the Government of France deserves, in my opinion—and I am glad to take this opportunity of declaring it in this House—the highest credit and the warmest acknowledgment on our part for never having made our altered position a subject of complaint. That International proceeding was taken, the report of the Commission was made by the Joint Commission on the part of the two countries, assuming the principle of the Tunnel, and pointing out in what way all the multitudinous arrangements in detail were to be made. That Report was quite as valid and important a document as any other International Report. I do not recollect that the Commissioners were made Privy Councillors, but in every other particular the Commission had all the importance of an engagement having the highest sanction.

I say then, that the promoters of this Tunnel, when they are told that the Bill has been rejected four times, are perfectly justified in saying, "Yes, but recollect that it was a Bill which, for many years, had received the unquestioning assent and approbation of all classes of this country, which had the distinct countenance and approval of successive Governments, and with respect to which, as we think, an unreasoning panic has been raised. Therefore, we are justified in again and again questioning at proper intervals that which we know to be a thoroughly unreasonable decision." I must admit that the right hon. gentleman is perfectly justified in stating that my hon. friend, the Mover of the Motion is not entitled to say that the House will not commit itself by its vote. I regard the second reading of this Bill, if it be carried, as a vote completely giving sanction to the Channel Tunnel in principle. The right hon. gentleman says that the expectation of commercial advantages are vague expectations, and are reduced to a minimum by the estimates of adverse critics. Has the right hon. gentleman ever read any examinations of the witnesses for the first project of railways in this country? Does he know that George Stephenson was challenged boldly and most confidently to say whether he would undertake to give his judgment that the steam-engine would be able to drag a train of carriages at 10 miles an hour. And, further, he was pressed as to the possibility of 8 miles an hour; and, finally, I think, whether he would guarantee that the train would go at 4 miles an hour. In all these questions, where strong interests are excited, the precise amount of commercial benefit to be expected will be the subject of a great difference of opinion.

The right hon. gentleman says, "Let well alone." Those words are not so musical to me as they may be to younger men, because I remember the time when, under a Conservative Government, the Defence Estimates of this country for the Army and Navy, which have now reached £35,000,000, stood at £11,000,000 a year. Do not let it be supposed that I am unaware that some portion of that expense has been most warrantably and justly incurred for effecting essential improvements in the Army. But I have known more panics and alarms a great deal in the days of high Estimates than in the days of low Estimates. It is only a few years since that we had a very extraordinary panic raised on the subject of the Navy, in the days of high Estimates. So I am quite prepared for a continuance and recurrence of these panics. I believe they are states of feeling which thrive by what they feed on, and that what is true of the love of money, is also true of the love of panic, sufficiently to invalidate the argument, "Let well alone." The right hon. gentleman dwells, and I do not wonder at it, upon a report of a distinguished Committee of military officers and engineers. I think the right hon. gentleman pushes the matter too far in saying that no distinguished military authorities are friendly to the project.

Sir M. Hicks-Beach: I did not say that.

Mr. Gladstone: I believe, then, that the right hon. Gentleman said a very small minority. I am sceptical about these reports of great military and engineering authorities on subjects of this kind. I am sceptical as to what they condemn from the recollection of what they have approved. There was never a more complete concurrence of military authorities, as far as I know, than in those reports of great officers and engineers which led up to an expenditure of £2,000,000 at Alderney, on the most confident assurances ever delivered by man—before we ever came near the £2,000,000 and were lingering among the hundred thousands—that after we had spent that money we should close up Cherbourg, and never hear of it again as a port for military expeditions. These are not professional questions. On professional questions I have a great respect for professional authorities, but with regard to the amount of danger—and that distant danger—to be incurred I do not think that they are in any degree to be considered as the best authorities.

At this moment my belief is that the people of England are not opposed to this Tunnel. The question is one which does not enter into the motives and considerations of elections; but if you could get at the feelings of the sensible population of this country—and by that I do not mean only the people who agree with me, but the mass of the working population—I believe that it would be found that they look upon the opposition to the Channel Tunnel on the ground of danger as an almost preposterous opposition, and share none of those apprehensions which perplex the right hon. gentleman. Then the right hon. gentleman says that this is a question of military power. No, Sir; it would be a question of military power if we had a land frontier with France. But we have a sea frontier with France, and the right hon. gentleman cannot suppose, or venture to assert that naval power does not enter into this question more largely than military power. The right hon. gentleman points out that we have no conscription in this country. I did not expect to hear a Minister of the Crown in this country casting a longing eye on that system.

Sir M. Hicks-Beach: I denounced the system of conscription as strongly as any member of this House could do. What I said was that the military authorities now opposed to the Channel Tunnel might, if we had conscription, view the project without apprehension.

Mr. Gladstone: I regret to have misunderstood the right hon. gentleman. However, Sir, I was not aware that it was admitted in this country that the conscription was a better, a sounder, and a more solid ground for military defence than the system under which our Army is recruited. The right hon. gentleman drew forth a lively cheer by his reference to a doubt expressed by Lord Beaconsfield whether this Channel Tunnel would ever pay 1 per cent. dividend. Why, Sir, I recollect the judgment delivered by the best authorities in the world on the question of the Suez Canal. A Commission was appointed of Dutch engineers, who from their practice in their own country, are the greatest authority on all great hydraulic questions and their results. They said the Suez Canal was possible, and would be useful, but it was hopeless to expect that it would ever pay 1 per cent. That is not the question. I do not ask myself what dividend the Manchester Ship Canal will pay. Some say it will pay a good dividend, while others maintain it will not pay at all. I am not bound to protect the purse and pocket of the hon. Baronet the Member for Hythe (Sir E. Watkin), who in these matters is perfectly competent to take care of himself.

The whole question for us is whether a solvent person is ready to undertake the scheme. Then the right hon. gentleman said no arguments had been adduced in favour of the Tunnel. I think the Member for Hythe may have felt that the general arguments in this case had been pretty well exhausted on former occasions, and I should be very sorry to repeat them. I did not understand, however, that there ever was a period when the power of military concentration on the part of France in reference to England was so great as it was in the time of Napoleon, and then it proved utterly abortive

I hold my old opinion with reference to what the right hon. gentleman has quoted, and I believe we have invaded France ten times for once that France has invaded us. We have held the capital of France alone once ; and we have entered it in conjunction with other Powers, and if there is a country which would feel justified in feeling sore and apprehensive on the subject of the Channel Tunnel, it is the French nation. In France there has been no apprehension. The French know that we are mainly the masters of the sea, and if we were to cease to have a prevailing command of the Channel that would, for the purpose of invasion, be fatal to our position. The question does not turn upon the Channel Tunnel in the slightest degree. The right hon. gentleman has laboured to prove that, for the transport of heavy goods, the Tunnel would only be available to a very limited extent. If so, how is it to carry the enormous heavy stores required by an invading army ?

The case of those who promote this project is a case resting upon general considerations which are pretty generally understood. We wish to promote the intercourse of nations. We have seen that enormous advantage has been produced by everything which increases that intercourse. No doubt it may be true that railway communications are not sufficient to abate and neutralize active and powerful causes of hostility ; but, fortunately, we have no powerful and active causes of hostility to France. We have seen the immense effects which have been produced by the commercial treaties with France. We see that France, although nearly the most protective Power in the world, is almost the only country in Europe which has not during the last few years been reactionary. Whether she will always continue so I cannot undertake to prophesy. That she has not been reactionary is owing to this augmentation of intercourse. If is often said that we wish to see this intercourse augmented, and that we wish to see an unbounded number of great steamers, and the largest possible intercourse carried on. But there is a great deal more military danger in the multiplication of fast steamers and of harbours than there is in the creation of this Tunnel.

I am ashamed of the attitude of this country in the face of France. I am obliged, if I meet a Frenchman, to say something of the conduct of recent Parliaments of this country in regard to the Channel Tunnel which I should be very unwilling to say in this House. I feel that we are in a position to say to France what 2,000 years ago the Spartan Warrior said to the Athenian. The Athenian, referring to the frequent invasions of Attica by the Spartans, said, " Many of your dead sleep by the side of the Ilissus," and the Spartan replied, " And not one of your dead sleep by the side of the Eurotas." There have been a hundred Englishmen who sleep among the dead in France for one Frenchman who sleeps among the dead in England. Now, Sir, I wish to bring about a recurrence of that sound and healthy state of things between England and France which existed as to this subject 20 years ago. I admit that there has been a tremendous reaction.

I admit that we have travelled some stages towards barbarism in this matter through the change of opinion that has taken place. I admit that that change is not confined to one Party or the other, although the Party opposite have the honour of claiming much the larger part of it. I feel convinced that it will pass away. We are not in such a hurry as to think that the welfare of the country depends upon the Tunnel, and we can accordingly afford to wait. Being asked by the hon. Member for Hythe (Sir E. Watkin) to give my opinion on the Bill, and the right hon. gentleman having forced me into the field, I must repeat the sentiment which on every occasion I have been ready to express, and say that I believe this to be a considerable measure and a useful measure, and that the arguments opposed to it deserve neither acceptance nor respect.

THE CHANNEL TUNNEL.

Mr. JOHN BRIGHT'S REMARKABLE FORECAST.

The following is an extract from the speech which Mr. John Bright delivered at the Annual Dinner of the Institution of Civil Engineers, held on Saturday, April 7th, 1883, at the Kensington Town Hall, under the presidency of Mr. James Brunlees. The quotation is made from the verbatim report, which the Secretary of the Institution has courteously placed at the service of the Channel Tunnel Company.

Mr. BRIGHT responded for the House of Commons, and, in the course of his reply, said:—

A great deal has been said about our being surrounded by water. Well, I dare say that has its advantages, but it is a great mistake to suppose that our being surrounded with water has kept us at peace. I recollect finding in an old book in Scotland a quotation from the historian Camden, written, I think, 300 years ago, which says:—

> "The British and the Gaulish shores
> Nature at distance keeps through many an age,
> Lest the two lines each other should engage."

Camden had an idea that the effect of what is called the silver streak between France and England was of great reason in keeping us at peace. If Camden had lived till now he would have known that the greater portion of the time from his death to our lifetime was a period when we were almost incessantly at war with France—that, in fact, our being surrounded with water has not kept us at peace, and I believe, historically, it is true, that during that time France and England have spent more years in war than any other two countries of the Continent of Europe. I merely mention this for the sake of showing that there is something else besides the silver streak which is necessary to preserve peace; and I venture to make one further observation with regard to steamboats.

Lord Derby has spoken of the effect of steamboats upon our colonies, to all of which we must all most heartily consent. But during the period when steamboat services were first established in the Channel, all the alarmists would have said, "With steamboats crossing the Channel, what confidence have we that we shall not be invaded by some European Power?" Now, I beg to observe that since the first steamboat crossed the Channel some 60 or 70 years ago, there has been a more perpetual peace between France and England than there had been for centuries before—(cheers). I venture to say further, that since the improved commercial relations between the two countries of the last 23 years there has been a more cordial feeling between the peoples of England and France than had existed during those preceding centuries, and I venture to foretell, though I have not a word to say for the Channel Tunnel, for I know nothing of it, and I shall trust to engineers to say whether it can be made, and to capitalists to say whether it will pay—but I do say be it by steamboats, be it by commercial relations, or be it by a Channel Tunnel, be it anything which will bring the peoples of the Continent into constant communication with the people of this country, that will be much more likely to preserve peace than any of those strange notions that peace is to be preserved by our being kept separate from them—(cheers).

Perhaps you will allow me in a concluding sentence to state what took place in 1861, when Mr. Cobden and I had a long interview and conversation with the late Emperor of the French upon the questions of the treaty and the abolition of passports. We went to persuade him to abolish passports, and we succeeded. A fortnight after our interview, passports were abolished between France and England, and they have been abolished since almost throughout Europe. The Emperor told us he had others to consult, meaning his Ministers, but that years before he had been in favour of abolishing passports, and that what he wished was that under the treaty more Frenchmen might go to England, and more Englishmen come to France. "What I want," he said, "is that the two people shall be so bound together that it shall not be in the power of any potentate or statesmen to involve them again in war"—(cheers). That is all I have to say on the Channel Tunnel. Whenever engineers declare it to be possible, and capitalists think it wise, I shall view the prospect with the greatest resignation.

I recollect that when the Suez Canal was first proposed, it was denounced by a powerful Prime Minister, and all the Chambers of Commerce, which had been in favour of it till that moment, shut their mouths, and English capital was not contributed, the whole affair being handed over to the French. I hope that this question, considering its importance, will have a calm consideration on the part of the Government, of Parliament, and of the people, and that what is for the true interests of both nations—for that which is good for one will be good for both—will be done—(cheers). The commercial, manufacturing, mercantile, and maritime interests of the country must be taken into consideration, for they are not to be sacrificed to the idea that it is impossible for greater communication to take place between France and England without danger.

When the Great Exhibition of 1851 was held, great preparations were made at the suggestion of the Duke of Wellington, because it was thought the peace of this city might be endangered by the presence of so many Frenchmen and foreigners—(laughter). We all recognise now what a strange idea that was; and, with regard to this question of the Channel Tunnel, I do hope that the people of this country 20 years hence will not find subject for condemnation and regret in the course we may now take. Let us in a great question of this kind act coolly, and not under the influence of passion or panic, and then our children will not have anything to regret in the result of our deliberation—(cheers).

The Channel Tunnel and Food Supplies in Time of War.

In March, 1913, Mr. ARTHUR FELL, M.P., published the following in pamphlet form :—

The need for the Channel Tunnel becomes more pressing every day. Travelling facilities are increasing in every direction, but the stormy, foggy Channel crossing remains much as it was thirty or forty years ago.

The question of the food supply of the United Kingdom in time of war is continually occupying the attention of all thinking men, and the proposed construction of the Channel Tunnel seems to offer the most complete and the cheapest solution of the problem.

Twenty-nine years ago a Joint Committee of both Houses of Parliament by six votes against four, reported against the proposal to construct a Tunnel between England and France. They considered that the danger of the French seizing by surprise or by force the Dover end of the Tunnel and using it to pour troops and stores into this country for the capture of London was too great to be risked, and that in consequence this great commercial highway and bond between the two nations could not be allowed by the Government to be completed.

The Committee found that the scheme was practicable, that it would cost under eight million pounds, and that it would greatly increase the passenger and lights goods traffic between this country and the Continent, but that the heavy goods traffic would probably still continue to come by sea.

Much has, however, happened since then, another generation has grown up, and the question of food supplies becomes more and more acute. France is no longer even a potential enemy, and it is recognized that if war were to break out between this country and Germany, or any other Power but France, then this Tunnel, far from being a source of weakness and danger, would be a source of strength, and would enable food to be brought into this country without the possibility of interruption by any hostile cruisers which might temporarily obtain the command of the trade routes and cut off the supplies of corn on which we depend.

When the Tunnel is available the danger of the price of wheat and bread rising to famine prices, which will certainly happen under present conditions when a great war begins, will be largely done away with. The prices on the Continent at Havre, Antwerp, and Marseilles, with the addition of the railway charge for carriage, will be the prices in England, and the neutral ports will be open to receive the cargoes for this country, which will then be carried from these neutral ports by rail to this country through the Tunnel without fear of interruption.

The suggestion that Germany might be able to use this Tunnel to attack us is too far-fetched to be worth while considering—she would have to invade Belgium and France, and then capture the French end of the Tunnel, and capture Dover and the English end without either country having the time to block the Tunnel and put it out of use. If Calais and Dover are both to be captured and occupied in force by the Germans, the fate of England will have been already decided, and the Tunnel could have no influence on it.

All the arguments adduced thirty years ago in support of the case against the Tunnel can now be used in favour of it. They were based on the idea that the French, or a Power holding the French end of the Tunnel, might by force or surprise gain possession of the Dover end before it could be destroyed, and then might utilize the Tunnel for the conveyance of troops and stores. Our friendship with France is so assured, and the possibility of anything arising to interfere with it is so remote, that to suggest that the construction of a Tunnel between the two countries must be delayed because of the danger we should run of a French attack upon us would create a smile at the present time.

We may run risks of invasion, but, as Count von Moltke, the great German strategist, said : "An invasion of England by the Tunnel would be the last one which would be attempted by any sane General."

The question of the assistance which the Tunnel would render this country in the event of a war with any country other than France was not considered by the Committee. In the case of our being called on with the other guarantors to defend the integrity of Belgium, the assistance the Tunnel would give us is incalculable. It is claimed by the experts that we could not, under present conditions, transport an army to the Continent until we had first fought and defeated our enemies' fleet and obtained the absolute command of the sea, which in the most favourable circumstances might take weeks, or even months. With the Tunnel made, troops could be sent to France or Belgium as fast as they were ready. At the present time the Navy men demand that at least ten fast cruisers should be built to protect our trade routes, to enable food to be brought during war without undue risk. These may cost ten million pounds, and would rapidly deteriorate, and the cost of keeping them up with crews would be very great ; whilst for the same capital the Tunnel could be built, which would give us far more security for our supplies, and would pay a handsome return upon the money invested in its construction.

In fact, the Tunnel would put us strategically in an extraordinarily favourable position. We should have all the security from invasion which our insular position gives us, and have, in addition, the advantage of drawing supplies from the Continent without any fear of interruption ; whilst, if the occasion arose, we could cut off this communication and be a complete island again. The possibility of the invasion of these islands by the air has materially affected our insular insecurity, and rendered the Tunnel, from a strategic point of view, of much less importance than formerly.

In any case, it must be remembered that the Tunnel would take six or seven years to construct, and before that time in all probability the air will be clearer ; treaties may have been signed between some countries, and the German-English naval rivalry may have ended. If the tension should continue and there were any appreciable risk, the completion of the Tunnel could be delayed until the crisis were past.

The Tunnel is, however, now put forward mainly as a great commercial and pacific undertaking which will unite us more closely with our neighbours, and bring about an unknown increase

in the interchange of goods and passengers, not only with France, but with the whole of Europe. The whole Continent will enjoy the benefit of increased trade; and whilst it will be most marked with France, Belgium, and Switzerland, still it will extend its influence to all Continental countries, and there will be more passengers travelling from London to Berlin, Rome, St. Petersburg, and Madrid, when once the Tunnel is opened.

British traffic abroad will be increased, but in a much greater degree the travel of foreign tourists from the Continent to these islands will be encouraged. It is difficult for us to appreciate the deterrent effect of the sea-crossing on visitors from France. It is a common remark among French ladies that they will not face the horrors of the Channel crossing, and they go to Switzerland, Italy, or the Riviera, instead of visiting England or Scotland. During November and December of 1911, and during the present winter, owing to continuous storms, the communication with France was for weeks kept up with the greatest difficulty. The passengers who were obliged to cross were often delayed for hours, and many of them were afterwards laid up for days by illness occasioned by the bad crossings.

Since the date of the Committee's report the experience and speed of tunnel-building has improved out of all knowledge. The question of ventilation was thirty years ago deemed a serious one. In those days traction by electricity was unknown, and the Committee had, from personal experience, only the smoke-laden atmosphere of the old District Railway to guide them. The Russian Government have recently decided to construct a tunnel through the Caucasus Mountains. This tunnel will be twenty-two miles long—longer than the Channel Tunnel. They will build this at their sole expense, whilst the Channel Tunnel would be built jointly by us and France.

The French Government has been throughout favourable to the scheme. They have never thought as worthy of consideration the question of the danger of the seizure of the French end of the Tunnel by us; and the French know what invasion by foreign troops means, and they have, notwithstanding, pierced the Alps with tunnels and joined their railways with the German ones with unbroken gauge, and have not done as they have in Russia, altered the gauge of their lines at the frontier, to prevent their use by foreign rolling-stock.

It is hoped that we are now more enlightened, and that our Government will join with the French Government in favouring the construction of this work, which will do more to consolidate peace and friendship between the two nations than any treaty could do.

The soldiers tell us it will entail the construction of a fort at Dover where the Tunnel emerges into the open air; that the trains will, in fact, pass through this fort, and so into the country. That fort will need a garrison. What if it does, and what of the expense? It is not worth consideration in a matter of this magnitude.

The Panama Canal is to have numerous forts and garrisons. The expediency of fortifying it is questioned, but the question of the expense does not weigh with the United States.

They say that our enterprise is at a low ebb in England, and that we are constructing no new great works here.

This Tunnel will show that we are still capable of big things.

It is agreed that a double tunnel will be required at once for the traffic, and before many years have expired a second will be necessary, and we shall then be wondering how we managed to get on so long without these tunnels.

The Government should approach the French Government and consult with it whether the Tunnel should be built jointly or by either Government alone. I am assured by most influential Frenchmen that France will welcome the suggestion warmly, and join in building it, finding their half of the money.

There are the old Tunnel works and borings on each side of the Channel. The Government would see if these could be acquired and utilized in any way, or if the Tunnel should be begun anew.

A Government guarantee of interest during construction would enable it to be financed without over-weighting or watering the capital by payment of interest during construction; and once at work it would, without doubt, pay handsomely, and probably prove to be a second Suez Canal Investment for the Government.

The writer has no interest in the old Channel Tunnel companies or in the railways which will be affected. His sole object is to try and get this great work of utility and peace accomplished, and the food supply of the country made more certain.

If the Government will take it up, it will be one of the happiest events with which the reign of our new Sovereign could be connected.

ARTHUR FELL, M.P.

Great Yarmouth,
March 25th, 1913.

THE BRITISH PRESS AND THE CHANNEL TUNNEL.

The remarkable change which has been manifested in public opinion in regard to the Channel Tunnel is clearly reflected by the leading organs of the Press throughout the country, an overwhelming majority of which are now strongly in favour of the scheme. In such circumstances, it is almost invidious to attempt a selection of the thousands of encouraging comments which have been published. Particular mention must, however, be made of the attention devoted to the subject by the *Daily Graphic*, which, in May, June, July and August, 1913, carried on a campaign in furtherance of the project. Just before this pamphlet was sent to press the *Daily Chronicle*, for the second time, entered upon a similar campaign.

Old Doubts Removed by New Conditions.

On May 28th, 1913, the *Daily Graphic* published the following article:—

"At some future date, near or distant, the Channel Tunnel will be driven. The question to which we think it needful to direct attention is whether the time for its construction has arrived. The position with regard to its merits, and the insistence on its demerits, have both changed since the Tunnel was first considered as a practicable scheme in the early sixties, or since the political and military aspects of it were submitted to diplomatic consideration in the seventies. A complete agreement between the Governments of England and France on the international situation which would arise on the completion of such a passage way between these islands and the Continent was reached in 1876. Since then the Tunnel, in spite of tentative borings, has remained in a state of suspended animation. Is it now time to wake up?

"There are several reasons for believing that it may be. There have been periods between 1876 and 1912 when the relations between England and France have been of a kind to give reality to the phantom fear that a Tunnel, by partially destroying the insularity, which is one of Great Britain's most highly-prized defences, would cast upon us the fresh military burden of guarding the approaches to the Tunnel. The most popular rendering of this fear took the form of insisting that, however carefully these defences were organised, and whatever means were taken to render an invasion by Tunnel an enterprise in the highest degree dangerous, yet that a moment might arrive when the organisation would slacken or break down, or the preventive devices (such, for example, as flooding the Tunnel) would be seized and rendered unworkable. Then, with the Dover forts and defences safely held for twenty-four hours, a raiding party might be landed, and the era of the new battle of Dorking would set in.

"It is not necessary to reiterate the arguments for and against this prospect or its possibility. It has more than once played a part in hypnotising the scheme at moments when it seemed about to revive; though it is not proven that it has been more effectual in doing so than the appreciation of the engineering difficulties of the scheme or the ignorance as to its prospects of being a paying undertaking. It will suffice to point out that the military and naval situation, in respect of defensive measures, has not remained stationary.

"By that we do not mean that the good understanding which now exists between France and England has rendered any future precautions of a defensive character for ever unnecessary; though Heaven forbid that that good understanding should ever be disturbed. There are sometimes, as the Irishman said in repudiating the idea of an agrarian outrage, 'affairs between friends,' and it would be highly inconvenient, to say the least, if at moments of friction the passage-way had to be closed down in response to popular tremors.

"But the situation is not the same from either a defensive or an offensive standpoint, or on a military or naval basis. Aerial navigation has changed it; the submarine has changed it; the range of 12 in. and 13 in. guns has changed it. Two out of three of these considerations have made any raid on our shores a much more difficult matter than heretofore. All three of them combine to make a tunnel raid an impossible enterprise, except in the circumstances of a paralysis of our navy more sudden than any raid could be.

"Whether this contention is sound or unsound can perhaps best be decided by considering that the invaders were not French but English, and the point of invasion not Dover but Calais. What would be the prospects of a sudden seizure of the Calais defences and the landing of a British expeditionary force under the fire of a ring of French forts and the supervision of the fleet of French aeroplanes?

"Or again, let us reverse the medal in another way. Suppose for the sake of argument that Great Britain and France in some period of European stress were not enemies, but allies. Great Britain might find it an extremely difficult matter to land an expeditionary force on the mainland of Europe, should that deplorable necessity arise. The difficulties would be the same in kind, if less in degree, as those which prevent an armed raid on her own shores. But had she the use of a friendly tunnel the difficulty would disappear. Still more important would be the lessening of her isolation in time of war in respect of food. Britain at war could never be starved out while she could be fed by tunnel.

"So much for the diplomatic and military changes which time has brought about. They do not stand alone. Since 1870 the progress of engineering has made the driving of such a tunnel a more practicable, if not a more plausible, undertaking. The total length of the tunnel, with its approaches, would be thirty-one miles. More than that mileage of tunnel has been driven beneath the London clay, not to speak of the tunnels beneath the Hudson,

In the United States, and similar enterprises elsewhere, and the boring of the Simplon. Knowledge has been gained not merely of the driving of such a tunnel, but of its working.

"Had such a tunnel been made thirty years ago, the engineers would not have known how to ventilate it. The electrically-driven train has made possible a project which would have been absurd with steam locomotives, and electric traction is a continually progressive science. In the third generation of the nineteenth century engineers were rightly optimistic of great enterprises; they are not less hopeful now, but in respect of the Channel Tunnel it is with better reason.

"There remains the question of cost and of the return for expenditure. Here the figures may be subject to revision, for they have not been re-calculated during the last five years at least. Sir Douglas Fox and the engineers associated with him, after consultation with the French engineers, calculated that its cost would be £16,000,000, including interest during construction, and that it would probably take seven years to make, but not more than ten years. For this sum twin circular tunnels, each of 18 feet diameter, and therefore large enough to accommodate the existing rolling stock of British or French railways, would be driven through the grey chalk underneath the Channel from Dover to Sangatte, or from Sangatte to Dover. The French company and the British company would meet in, or under, mid-Channel. The tunnels would be placed 36 feet apart, measured from centre to centre, but would be connected together at frequent intervals by cross-galleries, as was projected in the Simplon tunnel. The total length of either tunnel under sea would be 24 miles.

"The interest on the money expended would be paid, of course, by the payment received for passengers and goods. Here again nothing has stood still. When the scheme was first projected the actual number of passengers embarking and disembarking annually for and from the Continent was well under half a million a year. It is now on the way to two millions; and by the time the tunnel was constructed if it were begun now it might reckon on a million and a quarter passengers a year. The amount of goods traffic has been calculated at the same number of tons, and the annual revenue from both these sources as about a million and a quarter sterling."

On June 2nd, the *Daily Graphic*, in printing an account of an interview with Sir Francis Fox—one of the eminent engineers (Sir Douglas Fox and Partners) under whose supervision the Channel Tunnel will be constructed, if approved by His Majesty's Government, said:—

"Interest in the Channel Tunnel scheme increases daily Our correspondence testifies to that. Letters are reaching the *Daily Graphic* from all parts in support of the project. Not one per cent. are antagonistic. The public readily recognise that the changed condition of things removes many old doubts and fears, besides tremendously emphasising and strengthening the national need for the undertaking. Sir Francis Fox, the eminent engineer, whose able contribution we print on this page, believes that the construction "is inevitable, sooner or later." Sir Francis makes out a very strong case. The aerial factor, he remarks, has greatly modified the conditions, and has introduced great dangers to the country and nation which a tunnel would be of great value in neutralising. To the questions usually put by the average man when the tunnel question is raised, he gives complete and satisfactory replies And he also cites facts which naval and military critics will find very stubborn to explain away. There is the invasion bogey, for instance. Other nations have taken far greater risks by building bridges over rivers and driving tunnels through mountains, which are looked upon as natural frontier protections. Other points in the article are that the cost of constructing a Channel Tunnel would not be unreasonable; that the geological conditions are peculiarly favourable; that a new method of stopping water-bearing fissures obviates the possibility of any influx of water; and that the chances of fire or invasion are practically eliminated."

On the following day the same paper gave prominence to the views of well-known politicians and others as to the advantages which the Channel Tunnel would confer upon trade and travellers, the same being introduced in these words:—

"We publish this morning more opinions on the Channel Tunnel question from members of Parliament and others who have given the matter careful consideration. They agree that the scheme is both desirable and feasible. Like so many other people, several of those whose views are printed below have changed their minds with regard to the proposal. The altered conditions of things in recent years has swept away their objections—military, naval and political—and now they can see nothing but good in the project. Captain Faber openly avows his changed opinion. 'I think,' he says, 'it is of the utmost importance in relation to our food supply.' Possessing the Tunnel, England could never, he adds, be starved into making peace, even if this country were beaten at sea. In the eighties, as Mr. Bennett-Goldney points out, the military advisers to the Crown were against the Tunnel scheme, and this, no doubt, prejudiced public opinion. Mr. Reginald Blair's objection was a purely military one. But the position, as he remarks elsewhere on this page, 'has completely altered in the last few years'; and so he says, 'I support the Tunnel now.' We believe that the majority of Englishmen share this view. To our thinking there is no doubt that public opinion has veered round. The opposition of twenty years ago is understandable—just as understandable, in fact, as its absence to-day. We invite our readers to express their views in these columns."

CAPTAIN FABER, M.P., said:—

"I have changed my mind about the Channel Tunnel, and I have no hesitation in saying so. I am in favour of it. I think it is of the utmost importance in relation to our food supply. In these days we have to look at the improbabilities; and if Germany ever did lick us on the sea, at all events, possessing the Channel Tunnel, we could never be starved into making peace. I am for the Tunnel only on that account."

Mr. JOHN O'CONNOR, M.P.:—

"I visited the Tunnel works many years ago, when the promoters were bringing it forward. I remember going down to Dover with Admiral Field and many other distinguished naval and military men and politicians. It is, in my opinion, as feasible as it is desirable. The military protections seem to my lay mind ample. I am sorry to differ with such an eminent authority as Lord Wolseley, who was the responsible military adviser of the time I have referred to, and who expressed a very strong opinion against the making of the Tunnel. I believe the works at Dover have been kept in good order in the hope of a change of opinion. It does appear to me that the change is here. English fears of France are allayed. And I cannot see how an unfriendly attitude by Germany could affect the position, inasmuch as the ends of the Tunnel being in the hands of France and England, there would be the double chance against an unfriendly Germany. I am in favour of the Tunnel because of the vastly-extended facilities for trade and intercourse between the peoples which it would afford. Further, I believe that evidences of confidence, such as the construction of the Tunnel would be,

must produce a beneficent attitude of mind one towards another in the peoples affected."

Sir ALFRED EAST :—

"I have always been in favour of the construction of the Channel Tunnel because I believe that the more facilities we have of knowing the peoples of other nations the greater chance there is for the permanence of peace. Mutual respect is what we want to cultivate, and that cannot be done without greater knowledge of each other. Without losing our own self-respect we ought to be able to see the good qualities of others."

Mr. FRANCIS BENNETT-GOLDNEY, M.P. :—

"I am totally in favour of the Channel Tunnel. The French are our natural friends and allies, and all the apprehensions with regard to the Tunnel based on fear of invasion are to my mind ridiculous and will not bear examination. On the contrary, the Tunnel would help to make us safer. In case of necessity, modern military appliances would be available to prevent the Tunnel being used in any way adverse to ourselves. Our trade with France would be increased. It would be a splendid thing for the part of Kent which I represent, and for the coalfield.

"I have lived a great deal in France, and know the reluctance of the French to cross the Channel. I have invited sometimes as many as 1,100 French people to Canterbury myself, and I know how many of them did not come simply for fear of the sea passage. Further, I believe, though this help is not wanted for the moment, that the Tunnel would greatly help to develop the agricultural industry in Kent. Our best fruit crops come at a time when fruit is scarce in Paris, and improved facilities for transit would soon create more traffic.

"The great thing for people to remember is that conditions have entirely changed since the eighties, when Watkin was advised by the military advisers of the Crown that it would not be safe to allow the Tunnel to be built. Finally, the Tunnel would be an additional safeguard to our own food supplies in time of war."

Sir JOHN JARDINE, K.C.I.E., M.P. :—

"I am in favour of the Channel Tunnel. It would promote greater intercourse between us and the European nations, and be to the great pecuniary advantage of all the countries affected. On the balance, the fear of an enemy being able in some hardly intelligible way to use the Tunnel to our disadvantage is cancelled by the certainty of a much better understanding of one another, great mutual gain, and vastly increased profits.

"The present is a particularly timely occasion to take the most hopeful view of the prospects of the Tunnel, the Great Powers having shown a most auspicious desire to understand one another's views, and to preserve the peace of Europe. The goodwill of the other countries is a much greater protection than even fortifications at the end of the Tunnel, though if we want them we can easily put on plenty of fortifications. Moreover, no one considering this project at the present day can ignore the change wrought by the development of aviation. That is what we have to guard against far more than submarine invasion.

The MAYOR OF HAMMERSMITH :—

"The revived proposal to establish a Channel Tunnel between France and England demands, under existing conditions, serious, sane, and sympathetic consideration."

Sir J. ROPER PARKINGTON :—

"I welcome the Tunnel scheme most cordially both on political and commercial grounds. As sole founder of the *Entente Cordiale* Association, I think that it would be an admirable method of bringing England and France even more closely together than they are at present. Excellent as are the relations between the two countries, the crossing of the Channel is still, for many, a barrier. More English people would visit France than they do now if they could go by rail instead of by sea, and more French people would visit England. In our own case, the result of the improved facilities for travel would be more marked, I think, than in that of the French. The French, perhaps—because they have the whole Continent at their doors—are less inclined to cross the Channel than we are. The Tunnel would alter that, and I can only repeat that I am emphatically in favour of it from every possible point of view."

Mr. WILL CROOKS, M.P. :—

"Better communications always command my sympathies, and I think the Channel Tunnel would not only be good for England and France, but a great addition to the amenities of the world. I see no more harm likely to happen in the case of the Channel Tunnel than that of the Mont Cenis. As for the good that it would bring by increased intercourse, let me quote William Watson from memory :—

"'Hate and mistrust are the children of blindness,
Could we but see one another 'twere well;
Knowledge is sympathy, charity kindness,
Ignorance only is maker of Hell.'"

Mr. MICHAEL J. FLAVIN, M.P. : —

"I look at the Channel Tunnel from the point of view of a commercial man. It would make the relations of France and Great Britain much closer, and be of immense advantage to both."

Mr. REGINALD BLAIR, M.P. :—

"I support the Tunnel now. My former objection to it was on military grounds. The position is completely altered in the last few years. The chief benefit I foresee would lie in the reduction of rates on goods by the saving of transhipment on this side and the other. The trade between the two countries must benefit very greatly."

Mr. A. C. MORTON, M.P. :—

"I voted with Gladstone for the Channel Tunnel. I never felt afraid of anything in connection with it. It would promote more intercourse between the two countries. I am certain the apprehensions that used to exist in this country have died down owing to the *Entente Cordiale*. Of course, there would be no difficulty in getting money for the construction of the Tunnel, if you have decent promoters, not mere speculators. People did not like Sir Edward Watkin because they regarded him as too much of a speculator. Half of the money would come from France."

In the *Daily Graphic* of June 4th, Sir HENRY LUNN, expressed the opinion that the number of English people who visited Switzerland in the winter months might be "multiplied five-fold by a Tunnel." Mr. P. J. HANNON, Secretary of the Navy League, declared himself in sympathy with the efforts of the *Daily Graphic* to promote the construction of a Channel Tunnel, and added :—

"But since 1876 the times have greatly changed, and the advent of aeroplanes and airships has converted our sea coast into little more than a frontier, so that to-day a Channel Tunnel becomes a matter of importance to us. It is astonishing the enormous number of people who will not cross the Channel because they fear sea-sickness. A tunnel would do away with all that. It seems to me that the construction of a tunnel would

serve to complete and cement that friendship between France and this country which has been gradually expanding for so many years. In the unfortunate event of a European war the transport facilities which the Tunnel would offer would have far-reaching significance. The safe convoy of our expeditionary force, which it is commonly assumed would play no small part in a Continental war, would by this means be assured, although some people perhaps would say that this could more economically be done by increasing the strength of the British Navy. Reasons may be advanced for and against the project, but it would appear to the casual student of the question that the following may be cited as favourable :—(1) Greater facilities of access by the people of one country to another, and therefore the creation of a better understanding at closer quarters than is now possible. (2) The strategic advantage which would arise in the case of a European conflict, in which the Triple Entente might be involved. (3) The existence of the Tunnel would probably forge the final link in the permanent creation of an Anglo-French Alliance."

The views of Mr. A. BARTON KENT, the President of *L'Entente Cordiale*, were thus stated in the *Daily Graphic* of the next day :—

" It is inconceivable to me how anyone can oppose the scheme to-day from any point of view. So far as the *Entente* is concerned I consider it would be the very best thing possible. It seems almost incredible, but there are many hundreds of people who have an absolute dread of the few minutes' sea passage from Dover to Calais. They would think nothing of a twenty-mile journey by land, but the mere crossing of the narrow Straits seems to create in some minds an impenetrable barrier between the countries. This is even more the case with our French friends than with ourselves, and the construction of a Tunnel would mean that hundreds more, if not thousands more, of the French would visit England than at present. No better means of promoting the *Entente* could be found than by the intermingling of the people of the two countries. The menace that may have existed thirty-five years ago, when our strength lay largely in our isolation, has disappeared. Any argument against the Tunnel on these grounds is shattered by airships and aeroplanes. I am not an expert in strategy, but it seems to me there can be no reasonable argument against it, and politically I consider it would be a fine thing for both France and England."

Professor H. J. SPOONER, C.E., and Major W. ANSTRUTHER-GRAY, M.P., indicated their views on the subject in the *Daily Graphic* of June 6th. The former then said :—

" Few can fail to believe that the time has arrived when the vexed question should be carefully reviewed. The many important arguments in favour of a Tunnel have been ably advanced by your contributors, and we in this country, I am sure, are desirous of doing all that is possible still further to strengthen the *Entente* which has been so happily established with our good friends on the other side of the Channel. The grave question of our food supply in the event of war, which has apparently received such scant attention from those responsible for the safety of the country, seems quite naturally, to have arrested a good deal of attention in connection with the Tunnel question, but where is the food to come from ? And even if a sufficient supply from the other side could be relied upon, the Tunnel would probably be destroyed by the enemy, unless we had command of the air as well as of the sea.

" In fact, I venture to suggest that the deciding factors in the question of the Tunnel are military and naval, however desirable it may be to have such a direct and convenient communication between the two countries, and therefore we should be guided by those whose business it is to protect us from invasion and alarms. Hearing not a little of the evidence given before the Parliamentary Committee on the Channel Tunnel Bill in, I think, 1881, I was greatly impressed by the arguments of the military witnesses, particularly by those of Lord Wolseley (then Sir Garnet). He said that ' in his opinion a sufficiently powerful force could be landed at Dover on a dark night to overcome the garrison and take possession of the Tunnel mouth.' ' But,' said the chairman, ' surely Dover is well protected by heavy guns ? ' ' I agree,' said the witness ; ' the Tunnel head is commanded by a large number of powerful guns, but they have no ammunition ! ' Need I say this dramatic statement (an indictment of War Office efficiency of that time) had an effect upon those present which I shall never forget ? Doubtless our felicitous and important understanding with France has materially modified the military problem represented by the Tunnel, but before time and money are spent upon promoting another Tunnel Bill, surely such matters as those referred to above should be thrashed out."

Major W. ANSTRUTHER-GRAY's reply was in these words :—

" You ask my opinion as to the Channel Tunnel. Perhaps, in the first place, I should state that I am in no way interested financially in the scheme. I am in favour of it because I believe that it might tend to prevent the shortage of supplies in time of war. The days have gone by when we were absolutely supreme at sea. The fleets of other nations, or a combination of them, are gaining in strength, and may press us hard, while aviation brings a new factor to bear upon the problems of war.

" All foreign military and naval experts are well aware that our deadliest peril lies in the shortage of food supplies to our teeming population. Our Mercantile Marine may or may not succeed in evading or outpacing the enemy and bringing in sufficient food for the people, but the fact that this is a vulnerable point of attack will entail enhanced prices, which must mean hardship, and may mean starvation to the very poor, and all the horrors that a state of siege entails.

" I agree with those who think that the Tunnel might serve to some degree to help us in time of stress to obtain relief from such shortage, and for this reason I support the movement. There are, of course, the advantages of closer and easier communication with a friendly Power to be considered ; also the substitution of a swift and comfortable journey for the agony of a rough Channel crossing. But far above all comes the safety of our country, threatened by the shortage of supplies of food, without which all the vigilance of our ships and all the gallantry of our troops are in vain. As to the danger of invasion by tunnel, I believe that the advantages to be gained outweigh whatever peril may lie there."

On June 9th, the *Daily Graphic* published the following :—

" The most remarkable feature of the chorus of favourable views on the Channel Tunnel is the recognition that times have changed so much since the days of opposition to the idea that there is no longer any valid reason why the great under-sea tube should not be made now.

" We publish to-day the opinions of many more members of Parliament. Some of these are converts to the scheme, and admit that their old opposition has gone with Anglo-French enmity.

" The following members of Parliament give their reasons for favouring the construction of the Tunnel, and express the opinion that the time is now ripe for the undertaking to be taken in hand :—

Lord ROBERT CECIL, K.C., M.P. :—

"I am in favour of the Channel Tunnel. An additional means of communication between this country and France is a desirable thing. I do not believe the military danger is serious."

Colonel C. E. YATE, C.S.I., C.M.G., M.P. :—

"Conditions have greatly changed since the Channel Tunnel question was last before the public. I think it is certainly deserving of fresh consideration. I look at it purely and solely in connection with securing our food supply in time of war. I am strongly of opinion that the project ought at once to be examined in the light of the new circumstances by the Imperial Defence Committee, guided by experts."

Sir J. D. REES, K.C.I.E., C.V.O., M.P. :—

"I used to be strongly opposed to the Channel Tunnel. Now I am rather disposed in its favour. The development of aerial navigation has completely altered the problem. I certainly think the whole matter is worthy of reconsideration at the present time in the light of the new conditions."

Mr. H. K. NEWTON, M.P. :—

"Under the changed conditions of the present day the Channel Tunnel could only be beneficial to this country. I should imagine the military difficulty could easily be surmounted, so that the Tunnel would be really a service of strength rather than of weakness, as was feared at one time. It would help to extend relations and trade between this country and the Continent. French competition in trade is the one we have least to fear from as a business people."

Mr. JOSEPH KING, M.P. :—

"I firmly believe in the advantages of the Channel Tunnel. We should be safer, because obviously if the Tunnel were made and France were friendly or neutral, we could land our food supplies from India at Marseilles. Again, nobody knows yet what the future of aerial navigation in war will be. Are flying machines going to alter the conduct of war greatly, or are they not? Personally, I believe they are not. But suppose, as many authorities say, they revolutionise warfare, and you have aircraft cruising round our coasts; and supposing we are friendly with France. The very difficult and dangerous passage between France and England, which might very well be open to all sorts of aerial attack, is, with the Tunnel, absolutely secure. Hence, if aerial navigation develops greatly, the very safest place for transit will be the Tunnel. Another point is that an enormous number of people, both English and French, would travel who are now deterred by the sea passage. Think how laborious the present journey is to invalids, and how inconvenient to people with children. As a constant visitor to Switzerland, I know the enormous difference the tunnels have made there. Direct communication in through trains between Italy and Germany has immensely assisted the fellow-feeling of the trade between the two countries. I lay special emphasis on the Tunnel being a Government undertaking, as this would increase public confidence and largely obviate danger."

Sir W. P. BYLES, M.P. :—

"I am in favour of the Channel Tunnel because it would be a link making for increased intercourse and fraternity between peoples. That is my main reason. It has always seemed to me to be perfectly preposterous to argue, in view of all the money we spend on our Army, that we could not guard a hole ten feet square against a raid. I well remember bringing Sir Edward Watkin to Bradford—some twenty to twenty-five years ago—where he gave us a fascinating lecture on the Tunnel. It was a live question then; but people were so terribly frightened of France. Now, curiously enough, I find it is being talked of in the interests of Imperialism. I want a much bigger word—Internationalism."

Mr. JOHN WARD, M.P. :—

"I see no reason, either engineering, military or naval, against the proposal. But I see every reason in favour of it, alike as a means of creating a closer community of interest between the peoples and as a great trade influence. Having assisted in the building of tunnels myself, I know the Channel Tunnel is quite feasible. With the compressed-air shield, there is no engineering difficulty at all. The Tunnel might have an immense effect in educating our insular public opinion in this country into what I might call the Continental atmosphere, and enable us to look at things from the Continental point of view where now we see through insular spectacles. I consider the present is a very opportune time for renewing the Tunnel project. We are friendly with France, and once the Tunnel were built the tendency would be for neither party to bring about such a state of tension as would necessitate its closing—for, remember, there would be no occasion to close it except in the event of war with France. It should be a national undertaking. I would never allow a private corporation to become possessed of the principal means of communication between England and the Continent. I should be opposed to it entirely if it were proposed to be done by a private company. The British and French Governments are the people to do it. Or, if one Government won't undertake to find any money there should be a joint agreement between them as to its construction, and they alone should decide the passenger fares and goods freights from side to side."

Lord ABERCONWAY :—

"I spoke in the House of Commons twenty-five years ago on the second reading in favour of the Channel Tunnel Bill, and I subsequently became interested financially in the undertaking, which I consider might very well be proceeded with. Whatever the views of our military advisers in the eighties may have been founded upon, conditions appear to me to have materially changed in these days. I consider that, so far from the Tunnel impairing our national safety from a military point of view, it would become a valuable addition to the resources of the country, if by any chance we should lose the absolute command of the sea. It could be made of immense value for the importation of foodstuffs, should France be our ally. As for its value in the international Continental traffic for passengers, there can be no two opinions. However, the arguments in favour of proceeding with the work have been so fully stated by your numerous correspondents that I feel it unnecessary to reproduce them in support of my view."

The next day the *Daily Graphic* wrote :—

"It becomes daily more evident that the opposition of the past to the construction of a Channel Tunnel has now practically disappeared. On all sides it is admitted that a Tunnel is bound to be constructed sooner or later, and the majority of the eminent authorities consulted by the *Daily Graphic* agree that the present would be a most appropriate time to inaugurate this great international work. Admiral Sir Edmund Fremantle, who was at one time very strongly opposed to the idea of a Tunnel, admitted yesterday that with the changed conditions his opinion had considerably altered. We publish also the view of the famous French expert on airships, M. Louis Capazza, and an interesting article by Mr. W. J. Botteril, the originator of the scheme for a great naval base at Norwich.

"Admiral Fremantle said: 'I am not so opposed to the Channel Tunnel scheme now as I was, and I expect it will come

one of these days. I daresay it will be an advantage in many ways, not only because many people cannot stand a sea voyage, but because of the saving in trouble and time in transporting goods from one country to the other. However, I am not going to take an active interest in the project one way or the other, but I shall be very pleased to read what other people have to say on the matter."

To the Paris correspondent of the paper, M. Capazza, the President of the Commission of the French Aero Club for Airships, the leading authority in France on the subject of dirigibles, said :—

"The moment that England disposes of an airship, it would be impossible to invade the country by means of a Tunnel. The invaders might capture the exit of the Tunnel and entrench themselves against an opposing military force; but they could not protect themselves against airships or aeroplanes. A single airship could carry enough explosives to transform the entrance to the Tunnel into an impassable heap of ruins. As the exit remains immovable it could be shelled again and again. As London, or rather Aldershot, is only about two hours from Dover for swift airships, they could be on the spot before a thousand men could be landed through the Tunnel. Under the circumstances an invasion of England by the Tunnel, the exit of which could be bombarded by the forts of Dover and the warships in the Channel, and shelled by airships and aeroplanes, is a task which no Power in Europe would care to undertake."

On June 17th, the report of an interview appeared in the *Daily Graphic*, in which Lord ROTHERHAM (formerly Sir William Henry Holland, M.P.) said :—

"I am very glad to see that the *Daily Graphic* is giving its cordial support to the Channel Tunnel movement. The force of circumstances will, in my opinion, make the construction of the Tunnel an inevitable necessity before long, and when once it is open for traffic and its manifold advantages come to be realised hour by hour, the chief regret will be that we have denied ourselves those advantages for so long a period. I think it only fair to acknowledge very heartily the splendid services rendered by Mr. Fell in the House of Commons in raising there the question of the Channel Tunnel, and I was glad to see that a few days ago a non-party Committee of influential members of Parliament was formed. I trust that is a prelude to the formation of a similar Committee in the House of Lords.

"The case for the Channel Tunnel has never been anything like so strong as it is now. Ever since the question was last before the public the arguments against it have been growing weaker and those in its favour stronger all along the line. The cross-Channel passenger traffic has increased enormously year by year, and almost month by month; but such rate of increase is trifling in comparison with what would certainly ensue were the deterrent discomforts of the sea-passage entirely removed. In the interval since the matter was last discussed the science of engineering has so far progressed that the construction of the Tunnel could now be more quickly, economically, and efficiently done. Nor would there, I am certain, be any difficulty in raising the necessary funds for the undertaking. For us, therefore, the only question requiring elucidation is: Would the construction of a Channel Tunnel be in the best interests of this country?

"In my humble opinion the answer to that question is decidedly in the affirmative. Of course, we know that on the last occasion when the question was before the public fear of invasion was the great bugbear which had to be contended with. But since then not only has the remarkable progress made in the science of aviation robbed us largely of the supposed advantages of our insular position, but happily the *Entente Cordiale* has arisen; and so strong a hold has the *Entente Cordiale* obtained among the two peoples mainly concerned that the idea of their ever being enemies again has become simply unthinkable. Even were it otherwise, however, or in case the French end of the Tunnel were seized by a hostile Power, is it in the least likely that any enemy would be so foolish as to attempt to utilise the Tunnel for the purpose of invasion, seeing (1) that by the pressing of a button a portion of the Tunnel could be blown up; (2) that simultaneously with the construction of the Tunnel heavy guns would undoubtedly have been installed which would so completely command the Dover end that they would be able to make mincemeat of any invading troops emerging therefrom; and (3) that the railway line would doubtless pass along the sea front for a short distance after emerging from the Tunnel in order to place undesirable traffic at the mercy of a few battleships in the offing? With regard to the risk of invasion, therefore, seeing that to be forewarned is to be forearmed, if there is one spot on our coast-line where we should certainly make ourselves impregnable it would be the mouth of the Channel Tunnel.

"As a means of securing adequate food supplies in time of war the value of the Tunnel can hardly be over-estimated—to say nothing of its value as a protection against the inconvenience and even national peril which might conceivably result from prolonged labour disputes in connection with the unloading of ships at our docks.

"From the commercial point of view," Lord Rotherham continued, "apart from the reduction of rates to both countries due to two handlings of merchandise being obviated, we should be likely to gain far more from the Tunnel than our neighbours. The French end of the Tunnel would tap a far larger population than the English end, and from this fact it is reasonable to anticipate that the number of Continental passengers using the Tunnel would greatly exceed the number of British passengers. And inasmuch as every passenger is a potential customer, it would seem to be certain we should gain far more custom than we should lose. This would be the result even if shop prices were equal on both sides of the Channel; but since our prices are in many cases lower, the certainty of advantage becomes thereby still further accentuated.

"Yet, great as the commercial benefits would be in the interests of peace, they pale into insignificance," concluded Lord Rotherham, "in comparison with the social and political advantages which would certainly result from increased friendliness and goodwill consequent on the construction of the Tunnel."

Lord STRATHCONA, the veteran and universally respected High Commissioner of Canada, spoke with equal emphasis concerning the Channel Tunnel, and the *Daily Graphic* on June 19th, published the following :—

"If anyone has a right to say whether we should sacrifice our insularity by tunnelling through to our friends in France it is surely Lord Strathcona. Long, long years ago—it is difficult to realise the space of time that intervenes—he went away west from Scotland, when he was but a lad. He was Donald Alexander Smith, born in Scotland, 1820. That was all he was then, but he returned to England, and is to-day Lord Strathcona and Mount Royal, a pioneer of Empire, High Commissioner for Canada, and a man of ninety-three, who works in a way that is the finest example to young England that it is possible to imagine. It seems incredible, but it is true, and he has known the French and the bad old days when the English and they were at loggerheads—when the grandfathers of some of us were but sucklings.

"So he spoke yesterday with conviction—quietly, but with conviction—when asked what he thought about the Channel

Tunnel scheme. The altered relations between the French and the English peoples was the first thing he touched upon. It involved both the political and the sentimental objections of yore—of the days when the Channel Tunnellers were perforce content with having discovered Kent coal. Those days seem long ago to most of us, but they are a comparatively little space of time to Lord Strathcona.

"The *Entente Cordiale* has made all the difference. Of that there can be no doubt, and it was quietly insisted upon by Lord Strathcona. Our altered relations with France are such as would not have been so much as dreamed of by opponents of the scheme in other days. This being so, where could be found objections to a Channel Tunnel? Moreover, if there be no Tunnel there will be something else. And this was touched upon as succinctly by Lord Strathcona as it might have been by some young man to whom Hendon is home ground. England is no longer insulated. The High Commissioner for Canada realises this as well as anybody may. The air above the Channel has been bored before the earth beneath it, in spite of all our talk of insularity.

"So cheerfully Lord Strathcona admits the desirability of tunnelling. He is sure that the opposition of other days must have vanished with altered relations and altered conditions. If the air be not the means of bringing over large bodies of troops it may at any rate be the route for bringing over destructive material in addition to scrutiny and espionage. One could not say as much against a Tunnel, for in its case we could at any rate hold our own at our own end, and watch our own interests there. Apart from all this the comfort of ourselves and of our neighbours, and our mutual industrial and social conditions could not but be improved by the construction of a Channel Tunnel. This at any rate is the opinion of that veteran pioneer, Lord Strathcona."

Continuing its vigorous and public-spirited campaign, the same paper of June 30th contained further valuable testimony in support of the scheme when it said:—

"The Channel Tunnel scheme finds an enthusiastic supporter in M. Lucien Coquet, a well-known French barrister, who is now on a visit to this country.

"'The idea is not a new one,' explained M. Coquet to a *Daily Graphic* representative. 'Many years ago your Mr. Cobden and M. Chevalier, a French Free Trader, conceived the project of establishing a system of rapid communication between France and Great Britain by the means of a Channel Tunnel. There is a French Company already in existence. It was founded by Baron Rothschild and by the Compagnie de Nord, which has invested £1,000,000 in the undertaking, and has begun to tunnel under the sea. It meets every year, and is paying regular wages to its employees.

"'But at the present moment we are waiting for England to move in the matter. We in France are under the impression that the French should keep quite quiet, and should make no attempt whatever to influence British opinion, because we do not want it to be thought that the French are commercially interested in the scheme. The French Government has given an official concession to the company, and if we, on our side, began a movement in favour of the Channel Tunnel it would be said that we had an interest in it. When the British people say "We are ready," they will find the French people equally ready. I want, in conclusion, to pay my tribute of homage to Mr. Arthur Fell for the diplomacy with which he has approached this question, and for the energy which he has displayed in dealing with it.'"

The following are opinions on the subject of the scheme for a Tunnel additional to those already published in the *Daily Graphic*:—

Mr. ARTHUR PHILIP DU CROS, M.P.:—

"The grounds of objection to the Channel Tunnel have long since passed away. I believe it would be an excellent thing if it were undertaken. From a defensive point of view, I think it would be a positive advantage to us."

Mr. HOLCOMBE INGLEBY, M.P.:—

"I think certainly under present circumstances a Channel Tunnel would be an enormous advantage to us in the case of war with any other Power than France, because we should be able to get our food supplies through France. That is the main advantage to my mind. The subsidiary one of avoiding sea-sickness also appeals to me. My support of the Tunnel is subject to there being means of closing it in the event of imperative necessity."

Mr. GEORGE GREENWOOD, M.P.:—

"I supported the Channel Tunnel before, and I think it deserves support doubly now since the *Entente Cordiale*. The Tunnel would cement the union between us and France. I look upon it as a pacific instrument generally. The greater the means of inter-communication, the more do nations realise that they are reciprocally dependent upon one another, and the better it is for international peace. I do not think there is any military danger in the Tunnel; and it would be a very great advantage as a means of securing food supplies."

Mr. JOHN LEYLAND, the *Daily Graphic* naval correspondent, in an interview with a *New York Herald* correspondent, said that possibly a fresh inquiry into the question would show that British naval and military authorities not only now see no objection to the Tunnel, but a positive advantage:—

"Nobody questioned that very great advantages would result in closer relations between the British Isles and the Continent, especially, perhaps, in the possibility of supplying the kingdom in war time with food. Year in, year out, supplies poured in day and night to the value of £500 a minute, and the country had seldom in stock more than six weeks' supplies of wheat.

"Commenting editorially on the project, the *Herald* says that British military men now take a saner view of the Channel Tunnel, and seem inclined to work for its construction as strenuously as they formerly opposed it. The rapid development of a naval rival, and the new danger of attack that has been created by the aeroplane, have probably opened their eyes to the fact that a tunnel is now not only advisable, but even essential. In time of war, were the Tunnel in operation, England's food supplies would continue to arrive from the Continent, no matter how many of the enemy's 'commerce destroyers' might be scouring the seas.

"'The country has seldom in stock more than six weeks' supplies of wheat.' In these words is put forward the strongest argument for the construction of a Channel Tunnel. Without a Tunnel, part of the British Navy in time of war would have to be detached to safeguard the country's food supplies. With a Tunnel the entire navy could be devoted to the work of 'seeking the enemy to destroy it.'

"Perhaps a few old fogeys still may object that a Tunnel under the Channel would make England no longer an island. Practically, if not geographically, England ceased to be an island the day M. Blériot visited it by aeroplane. The Channel is no longer a sufficient protection; nor is a fleet. A brigade of

aviators, an aerial 'Forlorn Hope' could annihilate in a few minutes the most powerful navy and leave the way open for an invader. M. Blériot threw a bridge over the Channel. Why not construct a Tunnel under it?"—(*Daily Graphic*, July 14, 1913).

On July 15th the *Daily Graphic* published the views of six other members of the House of Commons:—

The Right Hon. CHARLES FENWICK, M.P.:—

"From the first inception of the movement for a Channel Tunnel I have been a supporter of it because I believe it would be one of the best things for cementing friendship between the commercial and industrial classes of this country and France. I have no fear at all of invasion through the Tunnel. Opposition to the Tunnel is not nearly so acute as it was in the old days."

Mr. NORMAN CRAIG, K.C., M.P.:—

"Personally I cross the Channel once a month, and I am too fond of the sea to go by the Tunnel if we had one. A great deal can be said for the Tunnel commercially, especially from the point of view of quick freights. There is nothing in the fear of invasion by the Tunnel—it is ridiculous—and I do not see how the argument that the Tunnel would destroy our island power can appeal to any man. In the event of war the Tunnel would be a pretty useful thing for our food supplies, if France were a friendly country."

Mr. WALTER HUDSON, M.P.:—

"The Channel Tunnel would be a great achievement of engineering genius. The traffic would be very heavy indeed. Electric traction would, of course, be essential, and that is feasible by the powerful hauling engines already in existence. It must be an undertaking for which the Governments of Great Britain and France would be responsible. From every point of view, including, I should think, the diplomatic—it would never do to let it go into the hands of private companies. I should be strongly in favour of the Tunnel as a means of improved communication which would make us better friends with the whole of our Continental neighbours."

Mr. ROBERT PEARCE, M.P.:—

"The Tunnel could not fail to facilitate trade and friendly intercourse, and it would enable all to go in comfort and free of sea-sickness between France and England. I think it would be an excellent thing."

Mr. ARNOLD ROWNTREE, M.P.:—

"Greater intercourse makes for the peace of the world. On that account I am in favour of the Tunnel."

Mr. GERSHOM STEWART, M.P.:—

"Thirty years ago I was strongly opposed to the Tunnel. I have revised my opinion. We are likely to remain very friendly with France for a long time to come. Aviation, moreover, has changed the problem of the Tunnel to a remarkable degree. Then it must be remembered that under the Declaration of London the Germans have a great pull over us in being able to get their foodstuffs into Rotterdam and take them by train to Germany. In the event of trouble we might use Continental ports for obtaining food supplies by train through the Tunnel. Those are some of the reasons that weigh with me. The subject must, of course, be carefully examined by experts, but on the whole my idea is that we can safely consider the construction of the Tunnel. Feeling against it is now a good deal allayed."

On the next day the *Daily Graphic* gave a statement made to its Parliamentary correspondent by Mr. T. P. O'CONNOR, M.P., who said:—

"I have always been in favour of the Tunnel, ever since the question was mooted. Anything which brings countries into closer communication with each other, giving their peoples greater opportunity to know and therefore to understand each other, makes for good relations between them. Undoubtedly the Channel Tunnel would enormously increase both the trade and the social relations between England and France, besides being a great blessing to tens of thousands here and on the Continent who dread the discomforts of the sea passage. All the objections which have been raised from the point of view of national safety I regard as perfectly ridiculous. As I understand it, a pound of dynamite could always make the Tunnel impassable to any invader. An invading army which got into the Tunnel, even if that were possible, would be seeking the best and quickest way of having itself mown down. I am convinced that the Tunnel could have no effect except for good upon international relations."

OTHER PRESS OPINIONS.

Extensive as is the space herein devoted to the subject, it is quite insufficient to show to what a large extent the project of a submarine railway between England and France is encouraged by British newspapers, but it is, unfortunately, possible to reproduce only a few typical extracts from articles which have recently appeared:—

WHY NOT?

"Mr. Asquith stated in the Commons yesterday that the project of a Channel Tunnel had not been reconsidered by the Committee of Defence since 1907, and to those who understand how great must be the impulse which moves Ministers to sensible action the statement is not surprising. But the ordinary man may well wonder why the idea of a Channel Tunnel should still lie under an antiquated ban. In six years all sorts of things have happened. International politics have advanced in directions which make the notion of an Anglo-French war unthinkable for many years to come, if not for ever. Military and engineering science has made so much progress that the problem of securing complete immunity from surprise attack at the English end of a tunnel has surely become simple. The new strategic conditions of Europe have forced to the front the question of our food supply in war time—a question automatically settled by a Channel Tunnel, so long as exit and entrance were in safe and friendly hands. Finally, the coming of the air machine has revolutionised both peace and war. We are no longer an island, and the cordon which the sea drew round us has been broken. Channel Tunnel or no, we are open to invasion by a new route, and all our ideas must be re-cast. Surely these circumstances have changed the problem which was considered in 1907; surely it is time to re-open the question then closed. We do not hold any brief for or against a Channel Tunnel. But we do claim that the whole question ought to be reconsidered in the light of new facts."—(*Daily Express*, London, April 15th, 1913.)

LONDON TO PARIS NON-STOP.

The same newspaper, on 17th April, 1913, published the following:—

Business men are deeply interested in the revival of the Channel Tunnel project. The subject was discussed on all hands in the City yesterday, and the opinion was freely expressed that the time for action had come.

"The obstacles that used to be urged by the opponents of the Tunnel do not exist now, and no new ones have been advanced," said the Secretary of the French Chamber of Commerce to an *Express* representative.

"What could England lose by it? As far as can be seen, there is nothing to lose and a very great deal to be gained.

"The Tunnel would have the great advantage, especially for business men, of bringing Paris nearer to London in point of time; it would facilitate the journey to any part of the Continent. Engineers have assured us that the slight difference between the gauge of the English railway rolling stock and the French can easily be overcome, and through trains will run as easily from Charing Cross to the Gare du Nord as from King's Cross to Edinburgh.

"Even if the Tunnel were used only for passenger traffic; and ferry boats were used to carry goods trains from Newhaven to Dieppe, or Folkestone to Boulogne, the Tunnel would justify its existence. But in point of fact it would almost certainly be used for goods traffic.

"France is anxious to see the scheme carried through. It has been in the air for 111 years, and on many occasions the French Government has approached the British Government officially on the matter. The Board of Trade once committed itself in favour of the scheme, and once a protocol was drawn up that only needed the ratification of Parliament.

"Work once started on the scheme, but for thirty years the workings have been at a standstill. It would be of great benefit to both countries to carry them to completion."

An interesting and novel point of view was put forward by the Organising Secretary of the Franco-British Travel Union.

"We exist to promote peace," he said, "but supposing war were to break out, the importation of foodstuffs into this island would be seriously jeopardised. Even if we held the command of the sea, there is nothing to prevent the enemy sowing floating mines in the Channel. Nowadays, too, there is the peril of the air; an aeroplane or two darting about over the Channel could do as much damage as a flotilla of destroyers.

"Underground, our food supply would be safe. It could come through the Tunnel in an unbroken stream at a time when the Channel was impassable and impossible.

"From the point of view of international peace, too, the Tunnel would be an advantage. There are many people living on the Continent who would like to visit England, but they are deterred by the terrors, real or imaginary, of the Channel crossing.

"Travel would be stimulated by the Tunnel, and with the spread of travel we could look for a spread of more tolerant ideas."

The opinion of Sir Arthur Conan Doyle is that the least intelligent thing that has been done in our generation was the refusal to build the Channel Tunnel. He said, at the inaugural banquet of the Franco-British Travel Bureau:—

"It is a matter of such urgent national interest that it should be pressed forward at once to completion.

"But it should be a Government undertaking," he added, "for it is far too important to be in private hands. If the Government carry out the scheme it might prove to be a national investment equal or superior to the Suez Canal shares."

The June (1913) issue of the *Railway Magazine* contained the following appreciative notice relating to the inquiry ordered by His Majesty's Government:—

"Time certainly worketh many wonders! Less than six years ago, after an inquiry instituted within the closed doors of the Committee of Imperial Defence, His Majesty's Government decided that the Private Bill which proposed the construction of a Channel Tunnel should not be allowed to proceed. To-day this matter is under the consideration of the Departments concerned,' says the Prime Minister. What has happened to bring about such a very remarkable change in the official attitude towards this great project? The promoters of the original scheme have not moved a finger, but have quietly and unostentatiously kept the Channel Tunnel Company alive. Nor has any definite declaration of public opinion been either invited or expressed. But other, and still more irresistible forces, have been in silent operation. The explanation of these altered circumstances is to be found solely in the fact that what was in 1907 regarded as a proposal fraught with peril to British power is in 1913 recognised as essential to the safety of the Empire and the preservation of European peace!

"We have, therefore, not the least hesitation in affirming that the prospect of a Channel Tunnel at last seems assured. Its realization, however, will come not as the immediate result of any private enterprise, but as the natural outcome of international confidence and goodwill. To England as much as to France such a work is destined to prove an element of incalculable benefit, and to the Continent of Europe as a whole a public and commercial boon of enormous value. The ill-founded fears and prejudices which existed a few years ago are not likely any longer to deflect the judgment of representative men on this side of the Dover Straits, and some of us will no doubt ere long be ashamed to recognize that our French neighbours were right when they refused to entertain the 'invasion' bogies which have hitherto been sufficient to prevent the completion of a submarine railway between England and France. The inquiry which, as Mr. Asquith announced on April 24th this year, has been undertaken by the Departments concerned, affects the Admiralty, the War Office, and the Board of Trade. It will, of course, be private and confidential, and the opinions of these three branches of the Public Service will in due course be laid by the Prime Minister before the Committee of Imperial Defence, which is already in possession of the elaborate plans, military, engineering, geological, commercial, and other data prepared, at great expense, by the promoters of the Bill which had in 1907 to be withdrawn. The Government may then feel fully justified in proposing that the scheme shall forthwith be carried out under international agreement and direction, or they may decide that a public investigation shall follow. In such an eventuality a Joint Committee of both Houses of Parliament would in all probability be formed for the purpose, and as the enormous pressure of work already resting upon the shoulders of the Prime Minister might naturally prevent the right hon. gentleman presiding over the deliberations of such an important body, the choice of chairman might be expected most appropriately to fall upon that distinguished soldier and diplomatist Lord Sydenham, who, when Secretary of the Committee of Imperial Defence, became familiar with every argument that can be advanced for and against the Channel Tunnel. The railway companies of the United Kingdom will await the issue with the keenest interest. It is quite possible that the visit of M. Poincaré will serve a useful purpose in furtherance of the project."

On July 19th the *Railway Times* wrote:—

"The New Zealander has arrived, not to view the ruins of London Bridge, but to advance the movement for the construction of a tunnel beneath the English Channel. He sits in the House of Commons in the person of Mr. Arthur Fell, the member for Great Yarmouth, and is acting as honorary secretary to the latest effort to enlist the support of members of Parliament to the linking up of the railways of England and France. A document containing the signatures of the members is to be presented to the Prime Minister, who will be asked to receive a deputation. The present generation would be amused if it could be induced to peruse all that has been written during the past fifty years

against joining up the South-Eastern and Chatham Railway to the Northern of France Railway. On this side we have a reminder of the controversy in the form of the Channel Tunnel Company, presided over by a distinguished French Baron, whose name is prominent amongst those who have laboured to bring about the cordial relations now existing between the two countries. It is not pleasing to recall that the cessation of the works at Dover was brought about by the opposition which suddenly arose in 1883 on the ground that the narrow road under the Channel would involve risk of invasion. The consequence was that when Parliament was asked for power to undertake the work the Bills of the Channel Tunnel Company and the Submarine Railway Company were not supported by the Government, and were withdrawn without having been discussed. Present-day prospects are decidedly promising, for the understanding between the two Governments has stood the test of years and the intricacies of European diplomacy. Advocates of the Tunnel would not be going too far if they put forward the argument that the friendship of France and the existence of the Tunnel would prove our safeguard in the matter of food supplies. This contention should appeal to the alarmists who are never tired of attributing hostile intentions to another Continental Power, just as the same people endeavoured to embitter the relations of France and Great Britain at the time of the Fashoda incident. One agency which is likely to promote the building of the Tunnel is the Franco-British Travel Union, which holds its first congress in London in September next, when one of the subjects suggested for discussion is the Tunnel project. . . . It is to be hoped that before long Parliament will authorise this beneficent project to be proceeded with and completed."

The Channel Tunnel.

"The Prime Minister's promise that the Committee of Imperial Defence will review the case for a Channel Tunnel brings into the limelight again a project that has agitated the public mind for at least forty years. Keen supporters of the scheme are doubtless disappointed at the non-committal tone of Mr. Asquith's reply to the non-party Parliamentary deputation which yesterday asked that the Government should no longer oppose the construction of a Tunnel, but under the circumstances he could not have acted otherwise. The considerations involved in the scheme are of the greatest magnitude, and though the arguments for and against a Tunnel have been debated vigorously enough in the past, they must now be discussed again in the light of the present state of international politics and of modern methods of warfare.

"Mr. Asquith obviously could not forestall the decision of the Committee of Imperial Defence by any strong personal expression of opinion, and those who support the scheme must accept his assurance that a full and impartial consideration will be given to it by experts. What is the position of the scheme to-day? A practicable plan has been devised for the construction of the Tunnel, and the project has the support of the most influential commercial bodies in this country and in France. The cost is estimated at sixteen millions, which would be raised in equal parts in both countries, and in seven years' time a double Tunnel constructed on the tube system would be available for traffic. From a commercial point of view the scheme has many recommendations. The journey between the two capitals would be shortened by many hours, and the terrors of sea-sickness would no longer trouble those who are not good sailors. Perishable merchandise would be more quickly delivered without intermediate handling, and the business relationships between England and the Continent would be facilitated in numerous ways.

"These are a few of the commercial benefits, but the main objections to be met are on the score of national security in the event of war. As Mr. Asquith pointed out, the Governments of both countries formerly favoured the scheme, but for the last thirty years successive administrations have consistently opposed every proposal in favour of a Tunnel. That opposition, which was chiefly on strategical grounds, was last manifested so recently as 1907. What has occurred since then to remove objections that appealed so strongly to the military authorities? The main points on this head raised yesterday were the continuance of of friendly relationships with France, the fact that the mastery of the air called for a reconsideration of the advantages of our remaining isolated, and that in the event of war the Tunnel would be useful in maintaining our food supplies. To take the last point first, it would be a mistake to allow the existence of a Tunnel to weaken our control of the seas because of the possibility of obtaining food by that means in case of dire necessity. Our defensive position is none too strong now, and neither that nor any other scheme must be used as a medium for weakening our naval supremacy.

"On the other hand an argument against the Tunnel is that it would entail expenditure upon the maintenance of an armed force near the entrance. The point is not one worthy of very serious consideration. In the event of war breaking out, it would be impossible for an enemy to successfully make secret use of the Tunnel to bring an army amongst us, and at the very first sign of such a possibility it would be the easiest thing in the world to put the Tunnel out of use. The closer association with France which a tunnel would involve is also urged against the scheme, the suggestion being that we should lose the advantage of isolation from Continental politics. We do not see that the Tunnel would affect the latter problem in any way, and we trust that opposition to the scheme will not be on alarmist grounds of this character. We believe that the time was never more favourable for a project that will be of immense service to our commerce and will tend to strengthen still further the friendly international relationships now existing."—(*Evening Chronicle*, Manchester, August 8th, 1913.)

France Wants the Tunnel.

Madame Farman, the Paris correspondent of the *Irish Independent*, writing in July, 1913, devoted one of her contributions solely to the subject of the Channel Tunnel, and said:—

"To put matters briefly, France wants the Channel Tunnel, and she hopes before another decade has expired to get it. The coming of the aeroplane, as Mr. Graham-White observes, has quite swept away the old argument that England's strength resides in her isolation. Looking a little ahead, this experienced aviator foresees that ten years will not have elapsed before there will be a regular aerial passenger service between France and England. A tunnel, or no tunnel, in 1918, he is persuaded, will not make the slightest difference in so far as fears of invasion are concerned, because by that date, heavier than air machines, instead of having an engine of 100 horse-power, will have engines of 10,000 horse-power and more. Such a forecast in presence of the amazing development attained within the last few years in flight can hardly be called preposterous."

The World of August 19th, 1913, contained the following as its leading article:—

"Now that the Channel Tunnel is within the bounds of possibility, it is interesting to remember that at one time those opposed to it had on their side the vast bulk of public sentiment. Just thirty years ago an almost ferocious campaign was waged

against the scheme by all the most notable people, and all the most weighty influences. It was led by the *Nineteenth Century*, then under the control of Mr. James Knowles, who was a fighter of the most uncompromising kind when really roused. He published in his magazine a "Protest" signed by fifty-four of the leading men of the day, with ten peers at their head—Bath, Sligo, Pembroke, Lytton, Dunmany, Overstone, Halifax, Waveney, Pembury, and Bury. There were dignitaries of all the Churches, including Cardinal Manning, any number of members of the House of Commons, headed by Sir John Lubbock, as he then was, also Tennyson, Browning, Huxley, Spencer, Frederic Harrison, G. J. Holyoake, and George Howell, and representatives of the Navy, the Army, and Finance. The final names were four London editors, all of whom have joined the majority—Hutton, of the *Spectator*; Borthwick, of the *Morning Post*; Greenwood, of the *St. James's Gazette*; and Blanchard Jerrold, of *Lloyd's Weekly News*. This accession of strength drew the adhesion of any number more of all ranks and all stations. It was probably the most brilliant list ever published for or against a movement. To-day over sixty per cent. of the signatories are dead.

"They were 'out' against the private Bill—they alluded to its supporters as 'speculators,' not as men who were trying to improve the facilities for international traffic and commerce, but as individuals with an eye to selfish gain. They adduced in their support all the then heads of the Services—the Duke of Cambridge and he (as he was then) Sir Garnet Wolseley at the War Office, and Sir Astley Cooper Key, the First Sea Lord, and others at the Admiralty; they published articles of virulent denunciation from Professor Goldwin Smith, General Lintorn Simmons, Major General Sir E. Hamley, and Admiral Lord Dunsany; they made extensive use of the report of the Military Committee on the scheme; and they added to it the strong denunciation which "George Ranger" sent to Mr. Childers, the then Secretary for War, who had asked for official guidance and got it in no compromising terms. So the wisely conceived project of Sir Edward Watkin was bludgeoned into unconsciousness before it could take much shape or do any harm.

"It had friends, and they bided their time. This seemed to be maturing about twenty-five years later, but Sir James Knowles—he had been knighted—was on the look-out, and no sooner had it raised its head than he hit it hard again in the *Nineteenth Century*. Alluding to it as a 'scheme of private speculators and company promoters, which, as soon as its character was realised by the public, was promptly repudiated and dismissed by the commonsense of the country,' he restated the case against the Bill, and adduced in its support articles by Mr. Herbert Paul, Mr. George W. E. Russell, who quoted Gladstone against it, General Sir F. Maurice, and Sir John Wolfe Barry, who, mostly on engineering grounds, recommended a train ferry. These articles, except the Editor's, were not as uncompromising as before. They showed that sentiment was changing. Indeed, the Bill which was deposited in Parliament on December 17th, 1995, found friends. The *Times* at first preserved an open mind, but on military grounds concluded that the construction of the Tunnel was inadmissible from the soldier's point of view until an adequate national army existed in Great Britain. Two or three months later it entered the hostile camp, declaring that few business men would quarrel with the Government's decision to stamp upon the scheme altogether. The Service papers, with the exception of the *United Service Gazette*, were absolutely hostile, while most of the London papers were still uncertain in tone, and there was no out-and-out friend.

"Meantime, French approval of the Bill was practically unanimous, and in view of the *rapprochement* between the two countries increasing weight began to be attached to it. Indeed, it is quaint that the very military arguments which were at one time used against the scheme are now in these days of the *Entente* actually being employed in its favour. The main arguments, however, now employed in France are purely economical, and lay stress upon the value of the Tunnel to French trade. Although the present Government is not hostile to the scheme, it should not be forgotten that, large though the majority has been in the ranks of those who were originally its strongest opponents, there are still not a few with us who resent it. The Liberal Government of 1905, which killed the Bill, has many living representatives. Its policy was stated by Lord Crewe in reply to Lord Rosebery, and Lord Lansdowne acquiesced. Nowadays, however, both the War Office and the Admiralty are believed not to be hostile to the project, while Finance is so far well disposed that the money will be easily found for any Channel Tunnel. There really remains only sentiment, and it is doubtful whether this will count very much. The poets and the scientists of the present generation show no disposition to rush into the field as did their predecessors."

On August 30th, 1913, the *Daily Chronicle* published the following "leader":—

"The idea of a Channel Tunnel lies always a certain vitality in August, when the Channel steamers are fullest and the maximum number of people have a fresh recollection of their discomforts. Sea-sickness is a malady against which science seems to make no progress, and there are other inconveniences of the packet service whose survival seems equally stubborn. They are all so many penalties exacted from the Englishman every time that he travels abroad, and their cumulative effect is such that he does so far less than other people. The extent of the restriction is not always realised. For instance, in 1912 there were 2,808,012 travellers between France and Germany, and 4,304,580 between France and the Low Countries. But there were only 1,062,000 between the English and French ports. When we remember that the latter figure represents not only our intercourse with France, but our intercourse with much of South Europe which we reach by crossing French territory, the way in which a sea passage discourages travelling and a through railway encourages it becomes strikingly apparent. It is not clear that goods traffic is equally impeded, because water carriage is definitely cheaper for many classes of goods, and no goods could be hailed through without re-handling even by the Tunnel, owing to the difference in gauge of the English and Continental railways. The commercial case for the Tunnel must rest chiefly on passenger traffic, and there it is very strong. It would make the packet services to France and Belgium, and perhaps even to Holland, a thing of the past.

"Channel Tunnels have been talked of since 1802, but the advance of engineering first made them a business proposition in the latter half of the nineteenth century. The critical year was 1883, when a Bill, powerfully backed by railway magnates in both countries, was rejected by Parliament. The rejection was on military grounds, and its prime mover was the late Lord Wolseley, then our foremost military man. For the subsequent 30 years this policy has held sway, but latterly subject to increasing doubts. On the one hand, modern invention has made enormous strides, not only in the art of constructing tunnels, but in perfecting devices for closing and obstructing them. The chance of our ever being invaded by the Tunnel is reduced to zero. In theory it must always exist, just as in theory we might always be defeated at sea, even if our fleets outnumbered everybody else's by three to one. In practice, it ought not to weigh in the balance. On the other hand, the international situation has changed. France, which during most of the nineteenth century was our hypothetical adversary and invader, has become our friend, and in military quarters, which 30 years ago feared the Tunnel as an avenue of French invasion, there is now a disposition to welcome it as an avenue to French help to Britain

or British to France in the event of our fleets being temporarily worsted by those of another Power.

"It is this last idea which at the moment has done so much to re-popularise the Tunnel project, and caused it to be once more seriously discussed by responsible persons both on our side and in France. We do not ourselves attach great weight to the argument, because, though we entirely approve friendship with France, diplomatic situations are in a sense always temporary, and the Tunnel is permanent. If we thought Lord Wolseley's fear of a Tunnel invasion were still tenable, we should support no Tunnel scheme. But as it is, the subway seems strategically to be something that we cannot lose by, and might in possible circumstances materially gain by. It would not make it any wiser for us to attempt the *rôle* of a Continental military Power, and those who favour it because they favour that *rôle* are simply backing a good idea for bad reasons. But in a crisis of temporary naval defeat it might help to save us from being starved out. In peace it would, we think, for the reasons given, handle but a limited goods traffic, and make little difference to any but passenger shipping. On the passenger side, we believe it might in a few years, double, treble, or quadruple the number of British people who travel abroad and the frequency of their travels; and would also render England a far better known country to foreign visitors. In that way British civilisation would be deepened and broadened, and the solidarity of Europe enormously enhanced, and by those great achievements mainly the enterprise would be justified."

THE CHANNEL TUNNEL: REVIVING INTEREST.

The *Railway News* of May 24th, 1913, contained the following:—

In the *Railway News* of November 9th last a report appeared of the proceedings at a dinner of the Franco-British Travel Union, when Sir Arthur Conan Doyle spoke warmly in favour of the dormant Channel Tunnel project. That distinguished writer returned to the charge in a powerful article contributed to the *Fortnightly Review*, and dealing with the matter from a military and political point of view is in favour of the building of such a Tunnel because he believes it "is essential to Great Britain's safety." Pre-supposing the maintenance of the *Entente* with France, Sir Arthur points out what an excellent thing it would be if during a war with an European Power we could get overland through France, and thence under the Channel, our food supplies from the Mediterranean Sea. Needless to say, the military opposition to the scheme has been considerably modified in recent years, while its advantages in stimulating trade and travel to and from the Continent are universally acknowledged.

The advantages which he claims for a national Tunnel are briefly as follows:—

1. If constructed by the nation for anything like the estimate advanced by capable engineers it should be a source of great profit to the country.

2. It should stimulate our trade with the Continent, since bulk need not be broken.

3. It should bring to England very many thousands of Continental travellers every year who are at present deterred by the crossing.

4. Should we ever be forced to send troops to the Continent, it provides a safe line of communications, besides ensuring an unopposed transit.

5. It enables food to be introduced into the country in war time, and would help us to hold out, even after a naval defeat. All the supplies of the Mediterranean are available *via* Marseilles.

6. It passes out some of our exports in war time, and to that extent relieves the Fleet of the duty of conveying them.

In a letter to the *Times* Major-General Reginald Talbot pointed out that: "Our fleets are now necessarily concentrated in home waters, and, consequently, the trade routes are unprotected to a degree which has never been the case in former times. At the outbreak of war the supplies upon which England depends for existence must in any case be disorganized and uncertain, and it seems to be of instant importance to consider the construction of a railway under the sea between England and France which would provide an absolutely unassailable communication and a supplementary route from the Mediterranean. The changes of conditions in late years have been by no means to the advantage of Great Britain, and the question of a Tunnel, about which there is some prejudice, should be re-discussed. It would in any case strengthen the *Entente*, it would increase the power of, and be of great tactical value to both nations. Should they cease to be on friendly terms it cannot be seriously maintained that it could not be instantly rendered useless by either nation. The Tunnel would not remove nor even diminish the necessity for our naval supremacy, but it would mitigate the danger to a portion of our food supply, and would relieve to some extent the anxiety on that account, and perhaps save the country from panic should war come upon us. . . . The question of cost is comparatively of no importance, but the five millions mentioned is a trifle for what must be advantageous and may be priceless to this country."

The prospects of the scheme to-day are clearly set out in the speech of Mr. A. Fell, M.P.—who has done valuable service in securing support for the undertaking amongst Members of Parliament—at the dinner of the French Chamber of Commerce on Thursday, reported on following pages.

We have in the past so fully explained the industrial and other advantages of the tunnel that we need not repeat the points. The main difficulty to be faced is that Parliament in these days only deals with measures likely "to catch votes," and the construction of the Channel Tunnel, although it would give a very large amount of employment, does not bribe anyone sufficiently directly to make it a good election cry. The accompanying reproductions of drawings recall some of the main features in the history of the scheme.

A Scheme of 1851.

Everyone knows that the Channel Tunnel scheme has been talked of for about a century. We give below, for instance, extracts from a scheme proposed in 1855 by Mr. James Wylson, C.E., for one way of meeting the difficulty, at a cost he put at £15,000,000, as to the feasibility of which we make no comment, our object being simply to show for how long a time the subject has been under discussion. Of course, there were many schemes before this impracticable one. Mr. Wylson wrote of his tunnel: "I propose to situate it at a uniform depth from the surface by means of ties below (and buoys above, if necessary) at suitable intervals. The continuation of the tunnel into the shore on either coast, I should dispense with, and, in order that it should have a partial freedom of motion, it should terminate with solid ends before reaching the shores." A full account of the project was given in *The Railway News* of May 5th, 1906.

A Tube of 1851.

In 1851 M. Hector Horeau appeared in the field with what he allowed to be a bold plan, but which appeared to him to hold out the requisite guarantee for so important an undertaking. M Horeau's project consisted in crossing the English Channel, 21 miles in extent, by means of a tube, or tubular tunnel, made of strong plate iron or cast iron, lined and prepared for that purpose, and which, placed at the bottom of the sea, should, besides the path for the surveyors, contain the two lines for the trains which would run within this tube. The slope given to the submarine railway, M. Horeau considered, would admit of a motion sufficiently powerful to enable the carriages to cross the Channel without a steam engine. The greatest depth of the sea

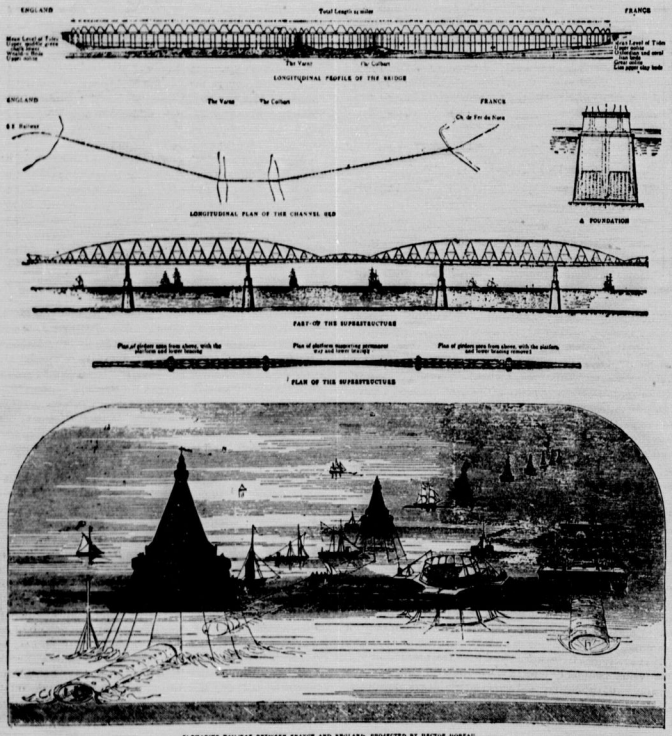
in the middle of the Channel would admit of the construction of inclined planes, by means of which the train would be enabled to reach a point where a stationary engine or atmospheric pressure might be employed in propelling the train to the level of the land railways of France and England. The subjoined engraving is reproduced from *The Illustrated London News* of November 22nd, 1851.

The Channel Tunnel in 1869.

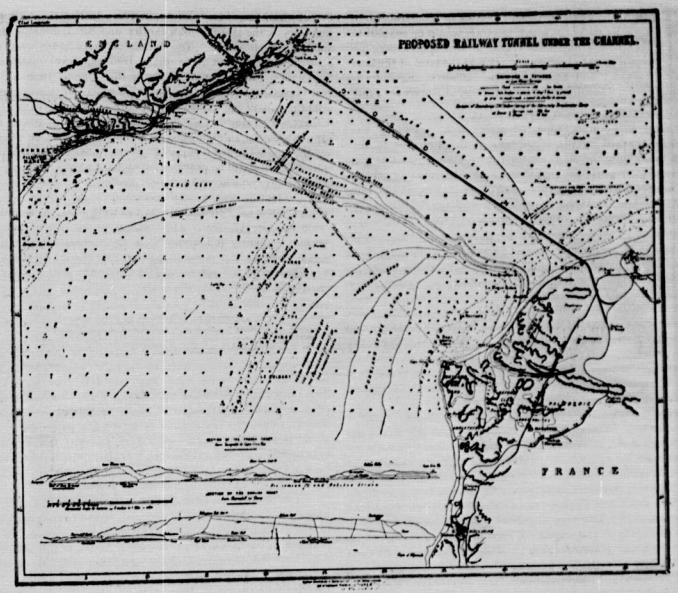
In 1869 a pamphlet appeared giving a statement by the Committee formed at the suggestion of the Emperor of the French to organise the plans for the construction of the Channel Tunnel. This report was signed by Richard Grosvenor (chairman), George Elliott, Vice-Admiral William Hawes, Stephenson Clarke, and Thomas Brassey, jun., with William Bellingham as secretary. We reproduce below the map issued with the report.

The Proposed Channel Bridge, 1889.

In 1889 a rival to the Channel Tunnel scheme appeared in the field in the form of a proposed Channel bridge, designed by M. Schneider, of Creuzot, and M. Hersent, ex-President of the French Civil Engineers' Society, and to which such well-known engineers as the late Sir John Fowler and Sir Benjamin Baker appended their names. The details of the scheme were read before the meeting in Paris of the Iron and Steel Institute in that year. The bridge was to cross the Channel from a point near Cape Grisnez to a point near Folkestone. In this manner it would pass over the shallowed parts of the Channel, such as the Colbart and Varne banks, and connect the shores where they approach closest to each other. The bridge was to be of steel, and the amount of metal required was estimated at a million tons, half of which would be provided by each country. The cost was taken at £34,000,000, and the time needed for construction ten years. The widest spans were to extend to some 1,638 feet (the longest span of the Forth Bridge is 1,640 feet), while the narrowest would measure 320 feet. The columns would rest on massive masonry supports, and would be in themselves 130 feet high, so that at high water it was calculated that the lowest height of the bridge above the water would be nearly 180 feet. Subjoined we reproduce some of the drawings.



CHANNEL RAILWAY BETWEEN FRANCE AND ENGLAND, PROJECTED BY HECTOR HOREAU.



The following leading article, giving strong support to the scheme, was published in the *Manchester Guardian* of April 28th, 1906 :—

After twenty-three years' abeyance, the plan for a Tunnel from a point near Dover to a point near Calais is soon to come before Parliament again. A form of the plan was considered by a Select Committee drawn from both Houses in 1883, and was not approved by a majority of the Committee, though a strong minority, including Lord Lansdowne, Lord Peel, and Lord Aberdare, was friendly. It is felt by the plan's well-wishers that the chances are better now. Fear of France counted for much in 1883, and France is now our friend. Much was made in 1883 of the difficulty of blowing up the Tunnel or some of its works at a moment's notice, if strategy required ; but since 1883 explosives and skill in their use have improved. The rivalry of certain mid-European ports was one of the things that spurred on the English advocates of the Tunnel in 1883 ; since 1883 that rivalry has certainly not grown less serious ; the growth of Antwerp's shipping business has been enormous. It is not merely that the projectors think of the economy—5s. per ton on the average, it is suggested by Mr. G. Turnbull in *The World's Work* for May—that would be effected by saving the double transfer of exported goods from railway truck to steamer and from steamer to railway truck. " We do not doubt," Lord Lansdowne's Minority Report said in 1883, " that the delay and irregularity inseparable from carriage by sea in its present condition have operated to the serious disadvantage of English manufacturers and exporters, and that the substitution for the present route of one more rapid, more punctual, and attended by fewer risks and inconveniences would occasion a large expansion of our trade and enable it to compete with that of foreign countries under infinitely more favourable conditions." It is also hoped that Dover might seriously rival Hamburg and Antwerp as a Continental port where passengers and merchandise from a wide stretch of mid-Europe would be shipped or landed to or from America, Australia and South Africa. Other advantages are obvious. Our manufactured goods for the Mediterranean and the East would go straight through to Marseilles, and save three or four days on the sea passage. The large British import of perishable garden and dairy produce from Normandy and Brittany would be more secure and punctual, as well as cheaper. The cross-Channel passenger traffic, which, according to Mr. Charles Dawbarn, now doubles itself every ten years, would probably increase enormously faster, to our advantage in business, pleasure and intelligence.

On the other side there are one great practical and one great emotional argument. The practical argument, as stated by Lord Wolseley in 1883, is that, " were a Tunnel made, England, as a nation, could be destroyed without any warning whatever by those who wish to invade the country." Lord Wolseley feared that the conquest of England might be a prize big enough to tempt some Power, " during a time of profound peace between the two nations," to seize the Tunnel either by a sudden rush through it from the other end, or by a sudden landing of troops at the Dover end, or by the help of treachery. Of course, what

as high a military authority as Lord Wolseley says—if his opinion be still the same—must be well weighed. But he has himself said—and this must qualify any alarm caused by his other expression of opinion—that "50 men at the entrance of the Tunnel can prevent an army of 100,000 men coming through it." Sir A. Alison, too, said at the time that an attack through the Tunnel "ought to be very easily met," and that "if there was any alarm at all, or any strainedness of relations, the precautions to be taken to meet it are so very simple that I am not inclined to fear it as much as I know many military men of great experience do." Unless we presuppose a state of things in which an invasion of England, quite apart from the Tunnel, had become a simple and easy matter for the enemy, it is difficult to see how a small force suddenly landed at Dover could escape annihilation between the cross-fire of the British garrison and of British ships of war. For unless we had been demolished at sea we could hammer the Tunnel Works at Dover to pieces and then deal at leisure with the enemy's unsupported landing party. The weakness of the treachery argument is that granted treachery you grant everything. Gibraltar would not be safe if enough of its garrison wanted to give it away. The absence of such widespread treachery as would cloak the hostile entry of a serious foreign army through a Channel Tunnel is one of those postulates on which the safety of the country rests at a hundred points day and night. But we do not want to burke the fullest discussion of the military argument against the project; we hope the whole thing will be threshed out this time only more fully than the last.

With the emotional, or "silver streak" argument there is no contending. You cannot confute an emotion, and this is one that we all share, more or less; the only question is how far we should insist on an emotional satisfaction if on other grounds it is clearly good for our country that it should go unsatisfied. And, after all, there is some appeal to the imagination in a scheme by which the soil of England and France, so long severed, would be reconnected. The very engineers' prospectuses, where they speak of boring all the way in the good hard lower chalk, call up a picture of the great unbroken chalk down as it ran in its completeness, past Guildford, or what now is Guildford, and Chatham and Dover, and the Pas Boulonnais, right on into central Europe, its ridge dividing the Meuse and the Moselle, the rivers that flow north-eastward into the Rhine, from the Oise and the Marne and the others that fall south-westwards towards the Seine, so that really the Kent streams and the great rivers of Western Europe are part of one system. The Stour drains the same original slope as the Scheldt, and Brighton and Gravesend are held apart by the same party wall that for a little distance separates the Romance from the Teutonic peoples of Europe. The breached cliffs at Dover and Blanc Nez look almost as raw as if it had been just the other year that the great watershed between them had been eaten away and England sent adrift with all the living things that had had time to penetrate from the Continent into solitudes, after the ice had thawed and left her habitable. By Channel Tunnel train we shall go through the chalk on which the wolf and bear walked dry-shod into Britain, and take our August holiday in Switzerland without seeing more of the sea than the first settlers who trekked across the high white down from the European mainland to pasture their reindeer in a Kent and Sussex that were then perhaps a moss-covered ledge left bare by the vast Northern ice-cap. It really seems a quite conservative measure. And not an extremely hard one, either; for one of the layers of chalk is fairly waterproof, as well as easy to bore, and the gradients are child's play, thanks to the puddle-like shallowness of the Straits—puddle-like as compared with serious seas. For while the Bay of Biscay not very far from land is nearly three miles deep, St. Paul's Cathedral could wade the Straits of Dover with the dome well out of water, and the Monument would not be quite submerged. The Silver Streak is not quite half as deep as Wastwater.

CHANNEL TUNNEL AND DOVER LINER TRAFFIC.

The *Dover Standard*, in a leading article published 15th November, 1913, wrote:—

"The suggestion thrown out by Sir William Crundall at the function on the new Holland Lloyd liner Gelria last week, of concentrating both British and Continental liner traffic at Dover by means of the Channel Tunnel has met with approval in various quarters. There is no doubt that Sir William's far-seeing scheme would make a vast difference to the liner traffic because it is certain that the great ocean liners would not proceed to the French ports for traffic if it could be concentrated here for them by means of the Tunnel.

"The delay caused to a liner by having to cross the Channel, enter a port for passengers, and then partially recross the Channel to get into the shipping route, means not only loss of time but a serious loss of money to shipping companies and passengers alike. Every few hours' additional steaming and feeding the hundreds of people on board, is a great financial consideration, which would weigh heavily with the companies concerned.

"The passenger traffic from Cherbourg to New York last year was 22,938, whilst from Boulogne it was 6,450, and the South American traffic from Boulogne last year was 14,000. This gives a total of no less than 44,000 people—outward traffic only—who might be brought to Dover by rail via the Channel Tunnel, to increase the number of local liner passengers. This would be a splendid capture for a start, and with the continuous growth which all traffic is showing nowadays, the business of the port of Dover would keep increasing as a result of the excellent feeder that the Channel Tunnel would prove.

"The Government Commissioner is, we understand, obtaining a considerable amount of evidence with regard to the possibilities of the Tunnel, and it is to be hoped that the report on this occasion will be favourable to the construction of this additional important link between England and the Continent, in which Dover has so much to gain.

"It is important to bear in mind that the journey from Paris and other places in France to Dover via Channel would only occupy about two-thirds the time that it does at present, and therefore it would divert this great traffic to the Northern of France Railway, and naturally the former would be very anxious to help Dover on that account.

"Boulogne is a very awkward place to tender passengers in rough weather and if we could attract all this traffic to Dover, it would mean an enormous thing for the Northern of France Railway, the S.E. & C.R., and the Dover Harbour Board, and the business of Dover generally."

NAVY LEAGUE SUPPORT.

The following appeared in the *Evening Standard* on the 25th November, 1913, under the headings—"Channel Tunnel Again"—"Progress of the Official Inquiry"—"Navy League Support":—

"The inquiry which is now taking place by Government departments, assisted by expert advisers, into the proposal to construct a Tunnel under the English Channel is in keeping with the promise of the Prime Minister to an influential deputation which saw him on the subject a few months ago.

"On that occasion the attention of the Government was called to 'the important changes which had taken place in recent years materially affecting the question,' and the Government was urged to re-consider the adverse decisions come to, for strategic reasons, in 1883 and 1907, and to give due weight

to the new conditions. The reply of Mr. Asquith was non-committal. He stated that the matter was frequently under consideration, and that it would be again reviewed in the near future.

"While admitting that new factors had arisen, he pointed out that it was no light matter to undertake the reversal of the policy of thirty years. At the moment he had not all the materials to found a judgment upon, and he declined to anticipate what the result of the inquiry would be.

"The reasons which have hitherto prevailed against a Channel Tunnel scheme have been military reasons. Objections based on similar grounds are still held, though, perhaps, not so strongly as they were twenty or thirty years ago. The Navy League, it may be pointed out, support the proposal. 'Our view generally is that it would be a source of strength, and not of weakness,' said Mr. P. J. Hannon, the secretary of the League, to one of our representatives to-day.

"'We have discussed the proposal several times. One of our reasons for endorsing it is that the Tunnel would bring the British and French peoples into still closer relationship by providing increased facilities of communication; it would enable each country to make a better acquaintance with the feelings and ideals of the other. Another reason is that it would be of considerable importance in maintaining the continuity of food supply in case of war.

"'Further, we think that the objections raised years ago by leading strategists, and still held by some schools of military thought, do not hold good any longer. We are quite satisfied that plans could be devised which would enable this country to close the Tunnel effectively if it were necessary to do so in the event of a crisis.

"'The old suggestion that an enemy might secure the English end and make use of the Tunnel for aggressive purposes is discounted in these days. The development of modern strategy and the invention of mechanical contrivances are sufficient to secure our safety on this side.'"

The Daily Chronicle of November 27th, 1913, contained the following as its first leading article:—

"We print to-day the last of three articles on the Channel Tunnel scheme, which is to be considered afresh in the light of new conditions by the Committee of Imperial Defence. It was solely on grounds of defence that former schemes were rejected; and the Committee has, of course, the very strongest qualifications for re-examining these, and judging whether time has or has not altered their cogency. If the Committee decided against it, the Government and the nation would have to accept their decision. But if they sanctioned it the Tunnel could, and presumably would, be proceeded with almost immediately. On its commercial side it shows every prospect of paying; and on grounds which are neither strategic nor commercial, yet concern deeply the progress and civilisation both of this country and of the Continent, it would command a great body of influential support.

"The progress of engineering and invention has not only improved and cheapened the construction of such tunnels; it has facilitated their obstruction and destruction, when desired. It seems to us difficult to doubt that on the occurrence of any events which might result in an attempt to use the Tunnel for an invasion, it could be almost instantaneously put out of action by water, by explosives, or by both. While, therefore, it could not injure us in war, it might in some wars be of priceless assistance; for so long as France was neutral, it would be a perpetual open door for food and other supplies, independently of our fortunes on the sea; whereas if France and ourselves were fighting as allies, it would be invaluable as a channel for the rapid transmission of military and other assistance from one to another. These are not negligible contingencies, having regard to our friendship with France, a friendship which the Channel Tunnel would itself foster by increasing the peaceful intercourse between the British and French peoples. But supposing they all vanished, and the Franco-British situation became what it was a century ago. We should still be no worse off, if we are correct in regarding the Tunnel as a door which the nation could always have open at will, and always at will inviolably shut.

"Everybody knows what a business a sea passage is, and how different it feels, even to the minority who are never sea-sick, from a plain straightforward journey by train. But it is left for statistics to show the cumulative effect of such a feeling when it is shared by millions of people. Between France and Germany, with a combined population of about 100 millions, there were in 1911 over 2,800,000 travellers. Between France and the Low Countries, with a combined population of about 52 millions, there were 4,350,000 travellers. Between England and the entire European Continent, out of nearly 300 millions, there were only 1,650,000 travellers. We often talk of insularity in the abstract; there it is in the concrete. The little streak of sea which breaks the railway systems means that for purposes of mutual understanding and mutual improvement England and the Continent are exceptionally held apart from one another. Yet it is hard to exaggerate, in the new Europe of the future which is growing up under our eyes, the importance of personal contact between the peoples. There are, of course, many lesser yet important considerations. There is, for instance, the traffic in perishable and that in breakable goods, particularly the export of our great pottery and glass industries, which would gain obviously by direct forwarding without shipment. But looking at the matter broadly, in an age which has girdled the world with railways, which has tunnelled the Alps and the Rockies, which has channelled Suez and Panama, this small matter of tunnelling the Straits of Dover and making a railway connection between Europe and its greatest commercial nation obviously calls out for accomplishment. If the strategical objections that alone have hitherto blocked it can be shown to be obsolete, the sooner it is taken in hand the better."

FURTHER NOTABLE OPINIONS.

Among further notable opinions in support of the Scheme, the following may be quoted:—

QUEEN VICTORIA:

"*You may tell the French engineer that if he can accomplish it I will give him my blessing in my own name, and in the name of all the ladies of England.*"

The PRINCE CONSORT:

"The Prince unfolded all the advantages which his elevated mind foresaw for England in the creation of a road to the Continent. He supported this project with truly enthusiastic sympathy."—(*Vide* "Under the Deep, Deep Sea," by Dr. R. J. Griffiths, 1887, p. 10.)

Lord DERBY, Secretary of State for Foreign Affairs, wrote to Lord Lyons, our Ambassador in Paris:

"Of the utility of the work in question, if successfully carried out, there appears no room for any doubt, *and Her Majesty's Government will there offer no opposition to it*, provided they are not asked for any gift, loan, or guarantee in connection therewith."

RICHARD COBDEN (December 24th, 1874):

"It is not enough to put the Government and the higher classes of each country on a friendly footing; that good feeling ought to penetrate the masses of the two nations, *and it is our duty to multiply all the means for an incessant contact which will certainly put an end to superannuated prejudices and old ideas of antagonism.*"

M. PAUL LEROY BEAULIEU (of the French Institute):

"We are stupefied in France at the objections that are being raised in England as regards the Channel Tunnel. The danger seems chimerical to us French. But I go much further. I say that the submarine Tunnel would be, in case of war, of supreme advantage to England. With the Tunnel, England would be able to draw all the supplies she wanted, either in foodstuffs, or material of any kind."

Sir J. FOWLER (in his evidence before the Joint Committee of 1883):

"People stated that the London Metropolitan Railway never would be made, and if it was worked, nobody would ever travel by it. *It has been made, it is worked*, and a great many people travel by it."

Sir JOHN COLOMB:

"My opinion remains fixed. I do not share the strong objections urged by some military authorities. . . . I have taken a part in opposing what I call the hysterical military school, who have said, I think, very wild things against a Tunnel at all."

Sir HIRAM S. MAXIM—

Is a whole-hearted supporter of the proposed Channel Tunnel. "For downright absurdity—shall I not say stupidity?—I have never heard nor read anything that can compare with the writings of those unthinking people who are now opposed to the construction of a Tunnel under the Straits of Dover." That is his conclusion. Dilating upon the subject, he adds:

"If a Tunnel were constructed under the Channel, there would be two small openings on the British side. It is assumed by these unthinking writers that a nation of over forty millions might not be able to prevent Continental troops passing through this Tunnel, and ascending on to British soil through narrow passage ways which, considered from a military standpoint, are little more than rat-holes.

"There is not one single argument used against the proposed Tunnel," Sir Hiram declares in conclusion, "that could not be brought with equal force against every bridge or tunnel constructed in England."

Mr. RICHARD BELL, M.P. (Derby):

"I have no misgivings in regard to the Channel Tunnel. In my opinion it would be an immense advantage to us as a nation, by providing greater facilities for our trade and commerce. The two nations would be the beneficiaries, and therefore the two Governments should construct it and receive the profits from its operations. The two Governments could, and no doubt would, agree upon some arrangements whereby both countries could be protected from invasions. I see no fear of this country being invaded by troops sufficient to alarm us. Arrangements could be made whereby in a few minutes the Tunnel could be flooded, and where would a troop train be then? From my view of the subject this is the least apprehensive."

Mr. R. C. LEHMANN, M.P. (Harborough):

"I am of opinion that the Channel Tunnel should be constructed, but on the second point as to its management by an International Commission, representing the Governments of England and France, I am not so clear, though I am disposed to consider the method suggested the best. The military objections to the construction of the Tunnel appear to me to have very little force. Why should it be difficult to guard, and, if necessary, to destroy what is nothing but a hole in the ground? If the military objectors and others, such as the Editor of the *Spectator* really thought the construction of the

Tunnel would bring about universal compulsory military service, they would, I fancy, become very zealous in advocating its construction. On the other hand, the commercial and social advantages would be enormous."

Mr. KENDRICK (Chairman, Staffordshire Chamber of Agriculture) :

"I am of opinion that it would greatly increase trade with this country, and I cannot see any danger if war should unhappily break out between the two countries."

Mr. R. LAIDLAW, M.P. (Renfrewshire) :

"The military objection is a stupid one. It might have been good fifty years ago, but it is quite out of date in the twentieth century. Railways make for better international relations in all parts of the world; the Channel Tunnel would vastly increase our intercourse with France, and strengthen the friendly feeling that now happily exists between the two countries."

Mr. W. C. STEADMAN, M.P. (Finsbury) :

"Some twenty years back I was one of a large number of representatives of Labour (including some miners) who paid a visit to the Channel Tunnel on the English side. At that time I was a supporter of the scheme, and have seen no reason to alter my opinion. The opposition is one of mere sentiment, and in the interest of the military authorities."

Mr. STEVENSON (Chairman, Southsea Trade Protection Society) :

"I have always been in favour of the Channel Tunnel being constructed; it would immensely increase the inter-communication between the two countries, and, in my opinion, provide a very strong reason for keeping the two countries in close relationship and friendship, and, if agreed to be neutral territory, no danger would exist. The steamship companies would still do large goods business, as their rates would be cheaper, and the more visitors cross and re-cross, and more trade would be done on both sides."

Mr. G. WHITE, M.P. (N.W. Norfolk) :

"The conception is to me an inspiring one. I see in it no forerunner of international trouble, but a means of closer relationship with another great nation, to the advantage of both. Any well-considered scheme will have my enthusiastic support."

Mr. E. J. HORNIMAN, M.P. :

"I am of opinion that the Channel Tunnel should be constructed, if proper precautions can be taken. I believe a Channel Tunnel would not only be of great commercial advantage to Great Britain, but would largely increase the number of foreigners visiting us, so reducing the prejudice against us, which is one of the chief dangers to International peace. Ignorance in this case means prejudice."

Mr. J. A. GODWIN (Mayor of Bradford) :

"I have always favoured the construction of the Channel Tunnel. The more nations know of one another the less likelihood of war."

Mr. G. A. HARDY, M.P. (Stowmarket) :

"I believe this undertaking would tend to a deep feeling of friendship between the two nations. This will help towards peace throughout the world. I believe the fear of possible invasion to be perfectly groundless. The Tunnel could be neutralised, or engineers could easily make such arrangements as to close up the Tunnel at a moment's notice."

Lord ROTHERHAM (then Sir W. H. Holland, M.P., President of the Association of Chambers of Commerce) :

"As a business man, I regard the national safety as the first consideration; and because I am convinced it will not be impaired I support the Channel Tunnel. I believe the greater convenience of the Tunnel would increase the number of Continental buyers visiting the British markets."

Mr. JOHN SLAGG (President of the Manchester Chamber of Commerce, and a Director of the Suez Canal)

Said he "believed that if we had a Tunnel between the two countries, it would not only constitute a communication between England and France, but between England and the whole Continent." He remarked that if we had a Tunnel constructed, foreign customers would come to our markets, and see with their own eyes what English commodities were, and would do more than four times the business than can be done through agents. (*See* Blue Book, Joint Select Committee, 1883, p. 122.)

Sir HENRY OAKLEY (General Manager of the Great Northern Railway)

Spoke to the same effect, pointing out the advantages of the Tunnel for the transit of passengers, mails, and all light and perishable goods.

Sir BERNARD SAMUELSON

Believed that if French and German merchants were to come over to England in larger numbers it would tend to break down the practical system of the Continent. The construction of the Tunnel would very much increase the business of the staple trades, and decrease the expense of packing textile machinery, which is very great.

Sir JACOB BEHRENS

Said that an experience of 60 years had taught him that every facility given to locomotion and transport had benefited trade far beyond the expectations of the most sanguine. What might we not expect from the opening of a road without a break connecting the population of Great Britain with the 250,000,000 of people on the Continent of Europe?

Mr. Godfrey Wedgwood

Was strongly of opinion that increased railway facilities would enable English merchants to recapture the Italian trade which they had lost. The Tunnel would enable them to compete with Continental pottery wares on more equal terms.

Sir Thomas Wrightson:

"I do not believe the military authorities are unable to provide for the risks of invasion, which are greatly exaggerated."

Mr. J. Frankenberg (Mayor of Salford):

"I am of opinion that the Channel Tunnel should be constructed. I consider that the extra facilities for commerce, the quicker delivery of mails, and still more the great saving of time in the delivery of goods, should double or treble the traffic. Possibly Custom House officials might travel with the trains, and so save delay at either end. There would probably be a great increase in passenger traffic, as many people have a horror of crossing the Channel particularly in winter. Under the new conditions London people could with comfort spend the week-end in Paris. With regard to the military side of the question, my opinion is that the friendship resulting from the increased intercourse between the two peoples would render any danger of invasion a very unlikely contingency."

M. Gaston Menier (the millionaire chocolate manufacturer, and Member of the French Parliament):

"England and France are mutual customers of each other, and it is a standing rule in commerce, as in industry to strive to maintain the most friendly connections with one's customers, and to afford them every facility to visit the factory or the workshop or the premises of the firm whose goods they buy.

"I do not think that the British merchant navy would seriously suffer from the existence of the Channel Tunnel. Whatever British shipping might lose in the home carrying trade between near Continental ports and British ports would be quickly made up for in other ways. It may be pointed out that, even as it is, many of the passenger and goods steamers between Calais and Dover and Newhaven and Dieppe are the property of French owners.

"But apart from all these reasons, there is the paramount reason in favour of the Tunnel of the great interest which Britain must have in sending to the Continent by a rapid, direct and easy method of transport, without transfer, the many classes of goods which she exports to the mainland of Europe.

"I am convinced that the Tunnel would greatly increase England's metallurgical and coal trade with the Continent."

Sir Andrew Torrance, M.P. (Glasgow Central):

"The opposition to the Channel Tunnel is a bogey. The development of traffic by the removal of the present transhipment hindrances and waste of time will be of enormous commercial advantage to the whole of the European Continent.

Will People Travel under the Channel ?*

The following is a translation of a well-reasoned article which appeared in "Je Sais Tout," October, 1913 :—

More than a century ago the First Consul, talking with Fox of a proposal to construct a Tunnel under the Channel, which had been submitted to him by Mathieu, the engineer, said to the famous English statesman : "That is one of the great things that we could do together." This statement ought not to be forgotten, for it proves that Napoleon perceived the need of a route, the construction of which to-day is quite practicable.

The project submitted by the engineer Mathieu contemplated the construction of a Tunnel which was to be used by stage coaches. The carrying out of the work would have been problematical. As for the suggestion made towards the middle of the last century by Franchot and Tissié, to place along the bottom of the sea a great tube through which the road should go, it was scarcely more practicable. It was only about the year 1876 that the idea was conceived of basing the project for the construction of a Tunnel under the Channel on an exhaustive study of the geological strata of the bed of the Channel.

It was evident that it was necessary to commence in this way, because no one could think seriously of piercing such a Tunnel, unless he was certain of finding a waterproof stratum stretching right across the width of the Channel, free from the breaks which geologists call "faults," and which, by changing suddenly the level of the stratum, would render it useless for the purpose in view.

Borings were made both on the French and English sides through the enterprise of two companies which had been able to obtain command of a considerable amount of capital. Shafts were sunk at Sangatte and near Folkestone, and from each of these shafts a gallery was pushed forward which extended under the sea for a distance of 1,800 metres.

Operations had reached this stage when public opinion in England became concerned in reference to this submarine route, which it was thought might offer a favourable means of passage to an invader against whom the big guns of the British fleet would thunder in vain. Diplomacy took a hand in the matter, and the works were stopped. It is these works which it is now being urged should be resumed.

The chief difficulty in the way of having this done may possibly be found in the obstinacy of the English people in wishing to preserve the isolation of their country from the Continent, for the arguments put forward by British military commanders seem to the minds of those who are best instructed on the subject, and least prejudiced in reference to it, to have become quite puerile and without substance.

Doubtless the people of England have some haunting memory of the great invasions to which their country has been subjected in the course of its history ; but it cannot be admitted that the existence of the Tunnel would add to the danger of an invasion. The theory that it would will not stand a moment's examination, for one naturally asks the question, "What would become of the French soldiers who would arrive in small detachments on the shores of England ?" To show fear of such an invasion is to give proof of a cowardice that is indeed strange. It is necessary to ignore all the difficulty of military transports, including the loading and the unloading of them, if one is to pay the slightest heed to this perfectly groundless fear.

The French engineers, in their desire to get rid of every obstacle which might arise from British susceptibilities, have embodied in their designs a viaduct, the construction of which should allay the apprehensions of the most timorous of those across the Channel.

"We are willing to consent to the construction of the Tunnel," the heads of the British Admiralty declared, "if the guns of our fleet are in a position to destroy it." This condition, in the minds of those who formulated it, appeared impossible of fulfilment, for at first sight it does not seem easy to destroy a tunnel by means of a fleet. Nevertheless, by causing the approach to the Tunnel to pass over a viaduct along the strand at Wissant before the railway enters the Tunnel through the cliff, it has been made possible for a hostile fleet with a couple of shots from its big guns to destroy this portion of the work, and thus to prevent the Tunnel from being used.

Even more than this was done to reassure the public in England, which had been so needlessly alarmed. It was arranged that the engines for hauling the trains through the Tunnel itself should be propelled by electric power, and it was decided to build on English soil the power station which would supply the current for the trains coming from France. Surely that is the utmost which can be done to prove to the people of England that their fears are vain.

The defence of Great Britain, therefore, would not be in the least compromised by the existence of a Tunnel under the Channel. On the other hand, the Tunnel would contribute materially to the success of English armies in a conflict with a Continental power other than France.

Everyone knows that England does not live on the produce of its own soil, and is obliged to import from abroad the great bulk of the food stuffs which it needs. Thus, in case of war, a considerable part of the English fleet would be occupied in protecting the ships intended to assure the food supply of the United Kingdom. But if the Tunnel were in existence the necessary supplies of food could be conveyed by the route under the Channel, and the British fleet would no longer need to condemn a certain proportion of its vessels to a condition of immobility. This aspect of the question, to which attention has been drawn in the House of Commons, is of such importance that it ought to influence the English people in favour of a Tunnel which would deliver them from the nightmare of famine, now as potent among them as is the idea of invasion.

The opponents of the Tunnel, however, did not admit defeat. "If the carriage of merchandise follows this route in time of war, there is no reason," they say, "why it will not do the same in time of peace, and then the existence of a Tunnel under the Channel may subject our Mercantile Marine to the risk of being ruined." The fleet of merchant ships which they wish to defend in this manner has nothing to fear, for it is evident that the carriage by sea of all heavy merchandise and commodities of small value will continue to cost less than their carriage by rail.

In reality, all these reasons are only surface arguments. They hide a sentiment which wants to hear nothing of the arguments that are submitted to it, and which is inspired by the ardent desire of the English people to preserve intact their most ancient traditions. It is this traditionalism—although one may criticise it, it constitutes one of the secrets of the dominating strength of the race—which has inspired obstinate resistance to the realisation of a project that would, nevertheless, not fail to produce great economical advantages for England.

In spite of the sustained efforts of the railway and shipping companies to lessen the length of the passage of a strait in other respects of little importance, one cannot travel from Paris to London with the same facility as that with which one can go from Paris to Brussels. A sea passage aways constitutes for the majority of people an obstacle which helps to retard any rapid increase in the extent of our relations with England.

* The question of resuming, in order to bring to completion, the work of constructing a tunnel under the Channel is now under consideration. The undertaking, in spite of its gigantic character, is none the less quite feasible. In this article we explain why and how.

Indeed, although the number of travellers who pass in both directions between France and Germany is almost three millions a year, the number of passengers who pass between ports in England and the different ports of the Channel, the North Sea and the Baltic scarcely exceeds a million-and-a-half. This is relatively a small proportion, and the explanation has to be sought in the numerous changes from train to boat and from boat to train which complicate a trip between England and the Continent.

The Channel Tunnel would cause these inconveniences to disappear, and certainly there would soon be between London and Paris the same movement of passengers as that which already exists between the great capitals of Europe and Paris. The free passage of the strait at any hour of the day would have the advantage of preventing the delay for several hours, at Calais or Boulogne, of the great expresses from Germany, Italy or Russia, the passengers of which have to wait for the starting of the steamers. These expresses would go straight through to England, and the journey would be accomplished in a much shorter time.

It has been calculated that the making of the Tunnel would diminish by at least two hours the duration of the most rapid service which is at present in operation between Paris and London. An Englishman leaving London at eight or nine o'clock in the morning would be in Paris at one or two o'clock in the afternoon. He could leave Paris at six or seven o'clock in the evening, and be back in London between eleven o'clock and midnight.

It is evident that in a short time the movement of passengers between the two great capitals of the West would be doubled or trebled, and that the amount of business transacted between France and England would be increased in the same proportion. As the amount of travelling between France and Germany increased, our commerce with that nation also increased to the extent of 60 per cent., whilst in the same period our commerce with England has increased by only 30 per cent.

Everything, therefore, goes to show that the construction of a route under the Channel would be the beginning of an increase in the business between the two great nations which it would connect, and that a new prosperity would result from this great effort to get rid of a severance which in fact did not exist in pre-historic times, and which it has only pleased Nature to bring into existence at a comparatively recent period through the process of erosion.

But is it simply a question of a great effort? Is it not foolish to think of making it? Are there not, in a word, obstacles which even already enable the complete uselessness of the undertaking to be foreseen? This is the question which we have put to M. Sartiaux, the Chief Engineer of the Compagnie du Nord, who has made a deep study of this project of a Tunnel under the Channel, and whose high technical qualifications make the opinion which he gave us one of the greatest authority which it would be possible to obtain.

"The first condition in order that the Channel Tunnel may become a reality," said M. Sartiaux, "is the existence in the bed of the Channel of an impermeable geological stratum through which the Tunnel may be bored. However, this requisite stratum does exist. Almost eight thousand borings have been made in order to ascertain exactly the position of the different strata which make up the bottom of the strait of Dover. Among those geological strata, whose position has thus been determined with precision, is found that which geologists call the *cenomanian*, and which possesses the necessary properties. It has a thickness of 60 metres, and the close texture of the rock will prevent water from leaking through. The water which it will be necessary to get rid of according to the size of the works will be much less in quantity than that with which a pumping plant of moderate capacity can deal.

"At the same time, in order that these waters may roll away when the Tunnel is constructed, they must have a fall. If the water were to flow down a slope to the lowest parts of the Tunnel at each end of the line, the outline of the Tunnel, taken lengthwise, would then be like the back of an ass, and the highest level would coincide with the middle of the route. But if the lowest points were at each end of the line, it would be impossible to come above ground again save by means of slopes which would add considerably to the length of the trip. This solution has, therefore, to be abandoned.

"Another solution which has been preferred is one which consists in arranging that the water should flow down through secondary galleries running from the Tunnel to low levels, where the water will be thrown out by means of powerful pumps. These are the galleries the digging of which will be first begun by making use of the shaft at Sangatte, and turning off from the already existing gallery.

"The entrance to the Tunnel will be placed in the cliff a little to the south of Cran d'Escalles, near Blanc Nez, and the junction line will leave the Calais-Boulogne line at a point close to Marquise. The station offices and custom house will be situated at Wissant. It is here that the steam engine will be attached to the trains from England when they come out of the Tunnel. It will not be necessary to do more than simply to hook on the engine, which can be done in a couple of minutes. The delay will be very much less than that which is inevitable at maritime railway stations owing to the transference of passengers and baggage from steamer to train or from train to steamer.

This brief sketch [together with plans and sections published in *Je Sais Tout*] shows that the enterprise has been carefully thought out, and that there is no reason why plans arranged with such completeness should not be carried out without delay. This great work, which would be a new conquest of Nature by man, would involve an expense of £16,000,000.

The Channel Tunnel is not the only solution which has been proposed to enable trains to go directly from the Continent to England, and from England to the Continent. Suggestions have been made for making use of immense ferry boats like those which in many parts of the world carry entire trains across straits or channels. Is this idea practicable in the case of the English Channel, which is furrowed by rapid currents, and in which the tides are a factor of great importance? In any event the proposal has numerous supporters.

Finally, there was the project of building a bridge across the strait. This bridge, costing £40,000,000, would be supported on piers which would cause great obstruction to navigation. The currents which flow in that part of the Channel added to these new obstacles, and even intensified by them, would make of this piece of water, so crowded with shipping, a place where ships would run the greatest possible risk. Apart from these considerations, the possibility of building such a gigantic bridge is far from having been demonstrated.

To sum up, one single project remains which will enable England and the Continent to be connected, and it is that of the Tunnel under the Channel. The necessity and the possibility of this route under the water have been established, and if the work has been already interrupted, the new resources which are nowadays at the disposal of men will render its realisation more easy and more rapid.

Let us hope that it will soon be permitted to the two peoples who shall have accomplished this gigantic enterprise to set the seal in this fashion to an *Entente* which will increase their mutual prosperity at the same time as it will increase the peace of the world.

Dr. J. Crinion.

Benefit of the Channel Tunnel to British Trade.

THE EVIDENCE OF SIR ROBERT GIFFEN.

It was generally acknowledged at the time—and the opinion has since been frequently endorsed—that the most valuable evidence given before the Joint Select Committee of 1883 as to the benefits which the Channel Tunnel would confer upon British Commerce was that of the late Sir Robert Giffen, the well-known statistician, formerly at the head of the Commercial Department of the Board of Trade.

The information which Dr. Giffen laid before the Committee was based upon official statistics relating to 1880 and 1881, but although considerable modification is needed in respect of the period which has since elapsed, his arguments have to-day substantially the same force. He showed in the first place that the population of Europe in 1883 was about 300,000,000, of which 92,000,000 were in Germany, Holland, Belgium, and France—the four countries more directly interested—although he thought that Switzerland and part of Northern Italy might be included in the same group. In 1883, the population of the United Kingdom was 35,500,000 [in 1911 it was 45,216,000], and that of North America was about 60,000,000. So that, taking all Europe together, there were about 300,000,000 upon one side, and, taking the United Kingdom and North America together, nearly 100,000,000 on the other side; while in the smaller group of countries adjacent to this country and the United Kingdom alone, there were about 100,000,000 upon one side, and 35,500,000 upon the other side. This was the total population of the countries whose trade would be more or less affected by any facility which was created.

The imports and exports, transhipments and bullion between this country and the Continent amounted to rather more than £300,000,000 sterling—£166,000,000 imported, and £134,000,000 exported. Between the United Kingdom and the Continent of North America on one side and the whole of the Continent of Europe on the other, the shipping entries and clearances reached a total of £400,000,000 sterling. From Germany, Holland, Belgium and France the total imports into the United Kingdom amounted in 1881 to £98,000,000 sterling, while the exports were £88,000,000. The exports of domestic produce alone were £50,000,000, and the exports of foreign and colonial produce were £38,000,000. Therefore, an enormous proportion of our distributing business was with those four countries; while in respect of transhipment trade, the imports from the same countries amounted to £8,000,000, as compared with £9,500,000 from the whole of Europe, and the exports to those countries amounted to £2,000,000, as compared with £2,800,000 to all Europe. Again, almost all the bullion trade with Europe was with the same countries, and of our total trade with Europe, amounting to £300,000,000, about £200,000,000 was with Germany, Holland, Belgium and France.

Lord LANSDOWNE, the Chairman of the Committee: I suppose we may conclude that, in your opinion, there is an enormous mass of trade which would be more or less affected by the opening of a submarine tunnel?

Dr. GIFFEN: That seems to me the necessary conclusion from the facts themselves. There is already an immense amount of traffic between the different countries, and whatever facilities of communication are opened up, if they are of use to benefit the trade at all, will have a great effect. Even a small facility would have a great effect, owing to the great surface over which it is spread.

The CHAIRMAN next questioned the witness as to the trade of the nine ports closer to the Continent than others in the United Kingdom, namely—London, Dover, Folkestone, Harwich, Littlehampton, Newhaven, Rochester, Southampton, and Weymouth.

Dr. GIFFEN stated that of our total imports from the four countries which he had specifically mentioned (£98,000,000), £72,500,000 came to those nine ports; and of the total exports to the same countries (£88,000,000), £48,500,000 went from the nine ports. In other words, three-fourths of the imports, about one-third of our domestic exports, with about four-fifths of our foreign and colonial exports from and to those countries were coming in and going out of these nine ports.

Lord LANSDOWNE: Now, may I ask you whether you believe that of the traffic which now passes between the nine ports you have specified and the four home countries of Europe, a large portion would be attracted to the Channel Tunnel route?

Dr. GIFFEN: I should not like to give any estimate of how much, or anything of the kind, because I do not see how any one person could give such an estimate. But I think it may be assumed from the nature of the traffic, that the Tunnel would be likely to attract a certain portion, and that if the trade increase, as it seems likely to do, that *new route may have considerable*

traffic, without diminishing very much anything which goes by the other channels.

Lord LANSDOWNE: *You think it would have the effect of creating new branches of trade?*

Dr. GIFFEN: The tendency of the trade itself being to go on steadily increasing, *you may have a considerable traffic through the Tunnel without any diminution of the traffic going by other channels, and possibly an increase of the traffic going by other channels.* Still, the tendency of the Tunnel must be to attract a considerable amount of traffic of the kind which now passes between these nine ports and the Continent.

Lord LANSDOWNE: Is that the conclusion which your experience generally suggests—that improvement of communication invariably does lead to great expansion of this kind?

Dr. GIFFEN: It is a conclusion arrived at from general experience, and I think also that one may say about the Tunnel that it is in the nature of a bridge over a ferry, which is universally recognised to be one of the most important improvements which can be effected in transit. You see, wherever there is a short ferry, the desire of those connected with the traffic is to substitute a bridge for the ferry; and it seems to me that a Tunnel under the Channel would be of an analogous nature.

The Witness further said he believed that a considerable part of the wool exported from the nine ports mentioned would go through the Tunnel. Supposing the rates were not prohibitive—and it might be an important point for the Committee to consider in making any recommendations upon the subject, to see that the rates and facilities, not only for the Tunnel, but for the connected lines, were made such that they would facilitate traffic—then, as they avoided two transhipments in some cases, and in all cases at least one transhipment, the land route would compete very powerfully with the mixed water and land routes (of which he gave examples) that the goods must necessarily follow, if they did not go by the Tunnel.

Lord LANSDOWNE next asked the Witness whether he considered that the business of this country as a commercial *entrepot* was at all threatened by the recent improvement of Continental harbours and by other improvements in Continental communications?

Dr. GIFFEN replied that to some extent this country had been affected unfavourably by certain events with regard to the traffic. In absolute amount the traffic had not diminished, but certain kinds of business that we had were tending to go away from us. There was very keen competition, and we did not get so large an amount of the total trade as formerly. The Witness instanced increased imports of wool, tea and coffee at Antwerp and Havre.

Lord LANSDOWNE: Therefore, you say that the Tunnel would be of advantage to us, not only in creating and developing new trade, but in enabling us to retain hold upon the trade which we have held hitherto, and which is showing some signs of slipping away from our grasp?

Dr. GIFFEN: It seems to me that it is very important in that respect, and I should like to add that, speaking generally, I should attach very great importance to this description of trade, on account of its indirect uses to this country. It seems to me that the fact of our having this large distributing business, if we can retain it, assists in getting such facilities for our own trade as the Liverpool Cotton Market and our wool sales in London. No doubt the Liverpool Cotton Market and the wool sales in London began because we had the manufacturing; but it seems to me that having got them, they are of great assistance to our manufacturing, and it is of the utmost importance that we should lose no advantage which our manufacturers have, and one advantage certainly is these great markets for the raw material. The matter also is of great importance with reference to our general financial position. It is because the goods come to London so largely for distribution that bills are drawn upon London; and if the goods tend to go away, the tendency would be for the financial business to go away. So that, one thing working with another, a considerable change may be effected in our trade, unless we can keep as fast hold as possible of the distributing trade.

Lord LANSDOWNE: Leaving the question of goods traffic, I should like to ask you one question with regard to the passenger traffic. You stated at the beginning of your evidence the number of the populations which you thought would be affected. Is it the case that of those populations, a very small number indeed at present travel between England and the Continent?

Dr. GIFFEN: I may say that I can give you no better figure on this point than what you have already had; I should simply be dependent upon what witnesses have told you. I was quite aware, before that evidence was given, that the numbers were very small, between 400,000 and 500,000 per annum passing across the Channel.

Lord LANSDOWNE: In your opinion, would the opening of the Tunnel lead to an immense expansion in that class of traffic?

Dr. GIFFEN: I am disposed to think that, after a little time at least, that class of traffic must increase very much indeed, owing to the magnitude of the cities which will be connected. London, with its 4,000,000 of population [in 1911 the population of the Metropolitan and City of London police districts was 7,252,963] would be connected with Paris, with its 2,000,000 of population, and with the other great Continental capitals which

have large populations also. And one thing I would suggest to the Committee with reference to expense even now—some passengers at least appear to value very greatly the quick communication as compared with the slow communication. If you compare the fares by the Folkestone and Boulogne route with the fares by the Dieppe and Newhaven route, and with the fares by the Southampton and Havre route, you will find that the first-class charge is about £2 more for a return ticket by the Folkestone and Boulogne route than by the Dieppe and Newhaven, or the Southampton and Havre route; that is 20s. each way, although the difference in time by the express service, comparing the Dieppe and Newhaven with the Folkestone and Boulogne route, is not more than two or three hours, sometimes not so much as two hours, I think.

Lord LANSDOWNE: You would argue from that, would you not, that the public would willingly pay a still higher price to get still better accommodation?

Dr. GIFFEN: That a considerable number of the public would at least pay the same price as they now pay to avoid an hour or two of sea voyage. I assume that the price would not be greater than it is by the Folkestone and Boulogne route; but if the public pay 20s. more, as compared with the Dieppe and Newhaven route, to go by Folkestone and Boulogne, *a fortiori*, they would pay the same money to go through the Tunnel, or more.

Lord LANSDOWNE: I do not know whether you desire to give any evidence upon the question of the defences of the Tunnel. Of course, we do not expect you to provide us with engineering evidence; but, treating the question as one of insurance, should you be disposed to say that a very large outlay upon defences would be possible, and yet that it might bear a small proportion to the amount of benefit which would accrue?

Dr. GIFFEN: I have looked at the question from that point of view a little, assuming the statements that have been made by Lord Wolseley and the Duke of Cambridge and others in their military reports upon the matter, and what I should like to put before the Committee upon the subject, with regard to the expense of making a first-class fortress—which is one of the main points upon which Lord Wolseley and the Duke of Cambridge insist—*is that the expenditure of £3,000,000 sterling would be equal to an annual charge for interest of about £90,000, and I think that would be quite an insignificant sum compared with the commercial advantages alone of the Tunnel, if it answer at all the expectations which the promoters put forward, which I think to a large extent are well founded.*

Lord ABERDARE: *The national commercial advantage?*

Dr. GIFFEN: *The national commercial advantage, apart from the gain of the promoters.*

Lord LANSDOWNE: *You think that it would pay this country to submit to this charge, in consideration of the development of national wealth which would result?*

Dr. GIFFEN: *Not only to that charge, but to a much larger charge, whatever it might be. But I think that the point with reference to the Tunnel is that if it is to be of any advantage at all, it is to be of enormous advantage—that it is to make a great difference to us, so that the country could well afford to pay a very considerable sum indeed if the Tunnel should render necessary the additional military expense.*

Association of Chambers of Commerce:

RESOLUTION IN SUPPORT OF THE CHANNEL TUNNEL.

At the Autumnal Meeting of the Association of Chambers of Commerce of the United Kingdom, held in Antwerp, on the 16th September, 1913.

Mr. STANLEY MACHIN (London) moved:—

"That having regard to the importance of the proposed Channel Tunnel as a means of (*a*) connecting the British and Continental railway systems for through traffic, and (*b*) securing the transport of a portion of the national food supplies in time of war, which might otherwise be unattainable by sea, this Association is in favour of the principle of the construction of the proposed Channel Tunnel, subject to the necessary defensive safeguards; and urges the British Government to consider the project favourably under the existing circumstances."

He said that commercial men must recognize that whatever their opinions might be on such a very important subject, the determining factor was the Imperial Council of Defence. He thought it was a happy coincidence that the Association was discussing the question in a foreign land, because although it might be considered that the first and greatest result of a Channel Tunnel would be to benefit the countries chiefly connected, England and France, he maintained that such a Tunnel would benefit to a very large extent the whole Continent of Europe. Suggestions had been made for upwards of a century for connecting England with its nearest continental neighbour. The Tunnel was first suggested 110 years ago; the subject was again revived in 1856, and subsequently in 1875, and at the present moment there appeared to be an increasing desire that some such connection should be made. More than one scheme was before the general public, a ferry, a bridge, and a tunnel having respectively been suggested. He believed from an engineering point of view each of them was capable of being carried out, but so far as the bridge was concerned the difficulties were insuperable, and the cost, which was estimated at 22 millions, would alone be sufficient to daunt the boldest investor. Beyond that there was the political question, which did not seem to be generally understood. The influence of the countries concerned extended only to the three mile limit from the seashore, and in order to build a Channel bridge it would be necessary for the two nations chiefly concerned to obtain the united consent of Europe, and that he thought was quite impossible.

He freely admitted there was much to be said for a ferry, especially from the commercial point of view, in connection with the carrying of merchandise, and inasmuch as the expense involved was estimated not to exceed two million pounds, it had much to recommend it. He maintained, however, that the ferry would in no way get over the chief difficulty that the two countries were at present hampered by, namely, the inconvenience and the unpleasantness of a rough passage across the Channel. If the proposed ferry were adopted, travellers would not get rid of the effects of a rough journey when they reached one side or the other, but would have to continue the journey in unpleasant surroundings until Paris on the one side or London on the other was reached. He hoped to be able to show that the construction of a Tunnel would be the means of conferring an immense benefit, not only on the chief parties concerned, but on the whole of Europe. In the previous day's *Times* an article appeared under the title "A Channel Tunnel: The case against the scheme; a profit and loss account (By Our Military Correspondent)." The profit and loss account disclosed simply went to show that the result of the construction of the Tunnel would be to injure England in every possible way. Although the writer styled himself the Military Correspondent, he wrote as if he were the Commercial Correspondent, the Engineering Correspondent, the Retail Dealers' Correspondent, the Labour Correspondent, the Financial Correspondent and the Shipping Correspondent. Dealing first of all with the subject from the military standpoint, the writer of the article said that the great objections raised in 1883 before the Special Committee had not been answered. Personally he thought that was not correct. He had made it his business to endeavour to obtain the real objections to the scheme from the military standpoint; he had had the opportunity of discussing it with leading generals and he had not found one who feared the Channel Tunnel as a means of invasion. He desired to remind the correspondent of the *Times* of a point which was admitted by the chief military expert on Lord Lansdowne's Committee in 1883, when it was stated that 50 men could keep at bay an army of 200,000 men coming up through the Tunnel, and that the only possible danger of invasion through the Tunnel, or of capturing the English side of the Tunnel, was in times of perfect peace.

Major-General Sir Alfred Turner, a well-known military expert who served on the Committee of 1907, when the question was for the second time before the public, had stated:—"From the military standpoint, an invasion of troops through the Tunnel would be an impossibility, even supposing the way were clear for them, because a French army corps of 30,000 men requires for its conveyance at least 140 trains—that is to say, about 140 engines and 7,000 carriages. So it would take from twelve to twenty days of continuous work to detrain the soldiers! But before the first train had emerged from the Tunnel, the whole working of the tube could be rendered useless by means of electricity, and yet not be destroyed. As this could be effected from any reasonable distance, the town of Dover might even have been captured and the invaders yet be unable to utilize the submarine passage." Speaking as a layman, it seemed to him impossible for any real fear to be felt from that cause. Another point which the military expert dealt with was that of surprise. He referred to the fact that surprises had in previous years been carried out upon nations which had led to the most serious results. But since the days of telegraphy and the telephone and rapid sea transit, no surprise of any such kind had ever been carried out. Personally he had a higher opinion of British military men and the precautions they took than the *Times* correspondent seemed to have.

He declined to presume that our military men could be so criminally neglectful as to make it possible for the Tunnel to be a means of invasion in time of war. Other countries had no such fears. By means of the Mont Cenis, Simplon, and the St. Gothard Tunnels, which went through great strongholds of national defence, Italy had been connected with other countries, but without the slightest fear of invasion. The *Times* correspondent further stated that the construction of the Tunnel would be the means of the British market being deluged by cheap labour. He thought the poor people who visited our shores with a view to employment would not come by the expensive route of the Channel Tunnel; there would be far greater

opportunities for them to come by the ordinary cheap sea route, which undoubtedly would be followed. The statement was further made that agriculturists would be ruined by the importation of cheap goods from France and the Continent. British traders had not built up their position as commercial men by indulging in any such fear. They said, provided they had a fair field and no favour, they were prepared to meet any competition they were called upon to face. It was further stated that British shipping would seriously suffer, and the correspondent in dealing with the financial part of the scheme questioned whether it was sound. The statement was also made that the formation of one tunnel, although it would not be a financial success, would inevitably lead to the construction of very many tunnels, and that the whole of the commerce with France and the Continent would in time be carried through the tubes.

The *Times* correspondent might be a military expert, but he was certainly not a commercial expert. To suppose that the great British trade with France, by far the greater proportion of which was coal, would be carried down through the Tunnel, seemed to him to be the height of absurdity. The only shipping that would be likely to suffer to a certain extent would be the cross-Channel traffic, which was carried on by steamers under the control of the railway companies, who nevertheless were strongly in favour of the scheme. He thought it was impossible for shipping to be in any way interfered with; indeed, one of our leading shipping experts wrote to the *Times* on August 26th, pooh-poohing the idea that British shipping would suffer at all. One of the most important statements that had been made was that of the chief engineer of the North of France Railway, that if the scheme was carried out, it would be possible for travellers to reach Paris from London in five hours. It would be possible for a man to leave London in the morning, get to Paris in time for lunch, have five hours for business, and be home again in London before midnight, so that for the first time the British commercial man would be able to reach Paris from headquarters in equal time and with equal convenience to his German rival.

He further maintained that the construction of the Tunnel would lead to an immense increase in the volume of international traffic. Taking the populations of the connecting countries, France, Germany, Belgium and Holland, they showed a travelling population of 2 per cent. between those countries as compared to 1 per cent. between England and France. The point which surmounted all others in importance was the increased safety to the food supplies of the country in time of war that would be brought about by the construction of the Tunnel. The military expert of the *Times* referred to the fact that our shores could not possibly be blockaded owing to the numerous ports we possessed. That he agreed with, but when it was realized that 15,000 tons of wheat and flour were brought into the country every day it would easily be realized what a partial stoppage of the food supplies would mean, apart from which the danger did not lie on our own shores, but thousands of miles away through the transports being interfered with. A Member of Parliament had said that the Channel Tunnel would be equal to a new fleet of Dreadnoughts and cruisers, and he was not far from the mark in making that statement. He believed from every point of view, commercial and financial, the Tunnel would be a great gain, and he trusted the Chambers would show by their vote that they desired it to be constructed—(cheers).

Mr. W. Hanning (Paris, British), in seconding the motion, said his Chamber was an ardent supporter of the Channel Tunnel project because British residents in France, representing as they did British interests there, had always favoured any project which might tend to the improvement of commercial and social intercourse between the two countries. They considered the Channel Tunnel would be the means of improving immensely the intercourse of Great Britain, not only with France, but also with the whole of the Continent, and would enable this country to ensure its food supplies without having to mobilize a great portion of its Navy for that purpose. Mr. Machin had dealt very adequately with that portion of the project, and he therefore proposed to deal with the project from the point of view of its realization as an undertaking, and to demonstrate the possibility of carrying the work through. He had been connected with the scheme since 1907 at the time when it was last put forward for consideration in England, and the arguments put forward at that time were as such, he considered, confirmed, and were much stronger to-day than they were then.

He referred to the *Entente Cordiale* which existed between Great Britain and France, and which, he considered, might be looked upon as likely to be practically permanent; to our naval position in the North Sea, considerably affected by the great steps in advance made by certain foreign navies; and to the progress made in aviation, which had very materially modified our insular situation. All these were important considerations which had very materially changed matters, and the arguments put forward in 1907 in favour of the Tunnel were confirmed and rendered more valid by the developments which had shown themselves since then. Regarding the mechanical side of the problem, that of traction through the Tunnel, this would be effected by electrically-propelled locomotives, the same as in the Simplon Tunnel and the more recent Lötschberg Tunnel. This was a great improvement on the conditions contemplated only a few years ago, as the use of electric traction ensured every comfort and no risk of inconvenience through smoke, etc., given out by steam locomotives, nor any danger of accidents such as the terrible disaster which occurred a short time ago in the North of England. The gauge of the rails was practically the same in both countries, and, indeed, all over Europe, with the exception of Russia and Spain, and although there was some slight difference in the loading gauge (*i.e.*, in the overall dimensions of the carriages), this did not constitute any serious obstacle and could easily be overcome.

Passenger traffic between Great Britain and the Continent would be tremendously increased as soon as the Tunnel was opened, which meant an increase in the intercourse of Britishers with their Continental neighbours, and a better knowledge of each other and of each other's requirements was thus bound to result. That, he submitted, was a condition which should always be aimed at, and the Channel Tunnel would be a very important factor in its attainment. The relatively small number of travellers between Great Britain and France was undoubtedly due to the objectionable sea passage, and the opening of the Channel Tunnel would immediately bring about an immense increase in our interchange with the Continent, not only as tourists, but from a business point of view, and being in such close touch with the Continent an immense increase in our commercial relations would result. His friend M. Sartiaux, the distinguished Engineer-in-Chief of the North of France Railway Co., in a recent article he contributed to the Press, referred to the obstacle which some portions of the people in England saw in the existence of the Tunnel, by bringing into England certain characteristics of the French and Continental races which we would be better without. To his mind, however, the Tunnel would facilitate the importation into England of many good qualities possessed by our French friends which it would be considerably to our advantage to also possess; for example, sense of economy, greater cheerfulness in life and habits, and advantages to industries connected with applied art derived from closer contact with the artistic French temperament. As regards goods traffic, the Tunnel would be of immense service to many categories of merchandise, and particularly to those goods of a more luxurious nature which could afford to support the relatively heavy freight entailed by transport through the

Tunnel; goods which it was necessary to carry rapidly, which would suffer by transhipment or the breaking of bulk, and which could afford adequately to support the cost of such transport. But the heavier class of merchandise, such as coal, minerals, heavy machinery and all such bulky materials which could not support an overland freight tariff, would continue to be carried over sea, and so the shipping trade of England, contrary to what had been feared by many, would in no way be affected by the Tunnel. Perhaps the most serious objection to be dealt with was the military objection, and although he entirely sympathised with the solicitude shown by military experts in wishing to maintain the insular position possessed by our maritime frontier, he could not share the alarmist views expressed by those who considered there was any danger of invasion *via* the Tunnel. Our insularity had already been destroyed by aviation, and the Channel Tunnel would in no way add to any ill effects they might have to look forward to by our no longer being insular. On the contrary, it would counteract in many ways the possible harm done, for it would give the military and naval authorities the means of ensuring our food supply in time of war, which, by the very existence of aeroplanes and the non-existence of the Tunnel, might become both difficult and precarious. He referred to the possible destruction by aeroplanes of ships carrying food supplies to British shores. The Tunnel approach on the English coast would be so situated that it could be destroyed by the naval guns at Dover should necessity arise, but surely it was of more importance to consider the Tunnel as a means of defence to England than as a weapon to be turned against her. France was the least likely country to be an enemy to Great Britain; she was more likely to be an ally; and under such conditions the fact that the Tunnel would be the means of supplying Great Britain with food in war time ought to surely outweigh the military opposition. Added to that was the possibility of rendering the Tunnel useless by other means, such as flooding or even the neutralization of electric power in the Tunnel, which would alone render it perfectly useless for invasion, and yet keep it quite intact for re-opening after such a condition, if it ever did occur, had come to an end. The Paris Chamber was, therefore, firmly convinced that its project contained no element inconsistent with national safety, and it trusted with confidence that the National Defence Committee (to whose great work and authority such importance was rightly attached by the nation) would decide in that sense. For the supply of food to Great Britain in time of war the Tunnel would be of incalculable value, and he particularly called the attention of the meeting to that immense consideration attended with such grave consequences, if not realized. The Channel Tunnel would enable the populations of Great Britain and France to come into closer touch with each other and be the consecration of the *Entente Cordiale* which had stood the test of so many years. By ensuring an immense increase in their commercial intercourse it would be the means of securing perpetual peace between two countries who, by their geographical position, their economic basis, their converging interests required and completed each other—(cheers).

Sir ALBERT ROLLIT (ex-President of the Association) strongly supported the project of a Channel Tunnel as a piece of peaceful penetration, and said that, proposed as it was by the London and Paris Chambers, it should have most serious consideration. Now evil communications corrupted good manners—indeed they did by causing cursory remarks—(laughter)—but gratitude for good communications caused the ancient Romans to reverently call a bridge-maker a Pont-iff, as a civilizer of mankind. Intercourse and mutual knowledge were bases of peace, commerce, and industry; therefore the more the better—tunnels, ferry, bridge, or even aeroplane. He had promoted a tunnel under the Humber, and was now being asked to do so again. He had seen long sea ferries in operation, and all these were quite practicable, as were, from an engineering point of view, a Channel tunnel, ferry, or bridge; and the man who built the first or last would be a real Pont-iff. The strategists and military experts were all at "sixes and sevens," and there he would leave them—(laughter). They always saw some scare of an enemy in front of them, and often saw double—(laughter). On the first day volunteers were formed in 1859 he joined the force to fight the French. Whether the French heard of this or not he did not know, but they never came—(laughter)—and the scare ended in the *Entente*, in which he had some part—(hear, hear). That was the time when the experts—*ne crede expertis*—predicted, and described, the deadly battle of Dorking, near which Martello towers or forts were built to drive the French back into the Channel. He was speaking at Dorking once since and asked what had become of the forts—"Oh," they said, "we find them to be very good chicken-runs"—(laughter)—and Dorking, true to its traditions, still prefers pullets to bullets—(laughter). He agreed with the President as to ruinous expenditure in armaments by many nations, preventing social reforms which would strike at other forms of destruction and narrow the grim kingdoms of disease and death, and he also agreed with Cavour the Sardinian, and a real statesman, when he said, "You may do anything with bayonets—except sit upon them," though some persons seemed to enjoy such painful penetration—(laughter). The real persons to be considered in the matter of the Channel Tunnel were travellers, who would be vastly increased by it, for the Channel itself was often deterrent. For himself, his motto on the Channel—when he was residing both in London and Paris and had often to cross it—was "*Sic-transit gloria mundi*"—(laughter)—and though he had often tried to get a quiet lunch cheaply on the chops of the Channel—(laughter)—they had never agreed with him—(laughter). Only one serious argument occurred to him against the Tunnel—whether, the railhead being at Marseilles, some goods consigned to Britain would be landed there to the detriment of London, Liverpool, Hull, Southampton and other ports and by Marseilles becoming more an *entrepôt*. Beyond doubt cargoes would be so dealt with in order to avoid more frequent handlings, and some losses might be caused to British ships and shipowners and ports. But, in these days of canals at Suez, which had diverted much trade and cargo to continental ports, and was a factor in the development of Antwerp itself, and of Hamburg, and in the re-making of the Hanse Towns, as distributing centres for Northern Europe, and Panama, trade must often have to adapt itself to new commercial conditions. Shipowners would be quite equal to any such occasion, and the line of evolution was, happily, to make, by communications, the whole world more one and more akin—(applause).

The resolution was opposed by Mr. George Renwick (Newcastle-on-Tyne), but adopted by a very large majority.

The following Chambers of Commerce were represented at the Meeting:—

ABERDEEN	BIRMINGHAM
ANGLO-BELGIAN, LONDON	BIRSTALL
AUSTRALASIAN (LONDON)	BLACKBURN
BARNSLEY	BOLTON
BARROW-IN-FURNESS	BRADFORD
BATH	BRIDGWATER
BATLEY	BRIGHOUSE
BELFAST	BRISTOL
BELGIUM (BRITISH)	BURNLEY

BURY
CARDIFF
CHELTENHAM
CLECKHEATON
CORK
COVENTRY
CROYDON
DERBY
DOVER
DUBLIN
DUDLEY
DUNDEE
DUNFERMLINE
EDINBURGH
EXETER
FALMOUTH
FRENCH (LONDON)
FRIMLEY
GLASGOW
GLOUCESTER
GOOLE
GREAT GRIMSBY
HALIFAX
HARTLEPOOL
HECKMONDWIKE
HUDDERSFIELD
HULL
IPSWICH
ISLE OF WIGHT
ITALY (BRITISH)
JERSEY
KENDAL
KIDDERMINSTER
LANCASTER
LEEDS
LEICESTER
LEITH
LINCOLN
LIVERPOOL
LLANELLY
LONDON
LONDONDERRY
LUTON
MANCHESTER
MIDDLESBROUGH
MORLEY
NEWCASTLE
NEWPORT
NORTH STAFFORDSHIRE
NORWEGIAN (LONDON)
NOTTINGHAM
OLDHAM
OSSETT
PARIS (BRITISH)
PLYMOUTH
PORTSMOUTH
PORT TALBOT
READING
ROTHERHAM
SHEFFIELD
SOUTHAMPTON
SOUTH OF SCOTLAND
SUNDERLAND
SWANSEA
SWEDISH (LONDON)
TROWBRIDGE
WAKEFIELD
WALSALL
WOOLWICH
WORCESTER
YEADON

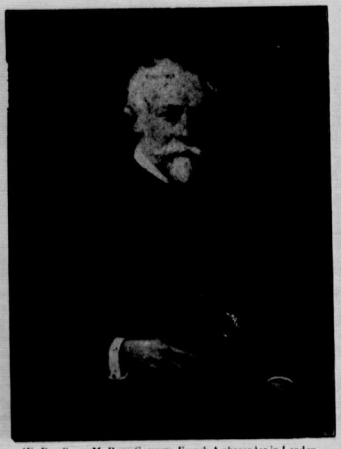
THE CHANNEL TUNNEL.

THE FRENCH CHAMBER OF COMMERCE OF LONDON.

At the annual banquet of the French Chamber of Commerce, held at the Hotel Cecil, on Thursday, May 22nd, 1913, His Excellency Mons. Paul Cambon, the French Ambassador, presiding, the toast of "The Guests" was acknowledged by Lord ROTHERHAM, who claimed that a Channel Tunnel would greatly develop trade between the two countries.

Mr. ARTHUR FELL, M.P., also responded, and his reference to the Channel Tunnel was received with great enthusiasm.

He said he hoped that the present movement in favour of the construction of the link between the two countries would be crowned with success. He recalled that sixty years ago the proposal to lay a submarine cable between the two countries received strong opposition in England on the ground that it would endanger British insularity, and injure British interests, whilst experience had shown that England secured the greatest benefits from the completion of that enterprise. Thirty years ago similar objections were raised to the construction of the Channel Tunnel, but the fears then expressed had more weight in those days than in the twentieth century, when friendly relations were firmly established. Thirty years ago the English and French nations did not know and appreciate each other as they happily did to-day. In former days there was hostility between the countries, which led to the erection of Martello towers and other barriers; but to-day it was realised that the best way to avoid war was to widen knowledge, increase international relations, and break down barriers. In former days there was jealousy of the Channel dividing England and France, but the day was coming when the two nations would join hands under the sea—(cheers). Mr. Fell went on to say that in a pamphlet he had written on the Channel Tunnel he pointed out that the arguments used thirty years ago against the scheme might to-day be urged in its favour. He had sent copies of the pamphlet to all members of the House of Commons, and he found that about three-quarters of those whose views he asked were in favour of the scheme, and the remaining quarter were indifferent. There were, of course, a few other members still opposed to the project, but the Tunnel had supporters amongst all political parties, and he hoped that before Parliament separated approval would be expressed by the House, subject, of course, to the views of the Imperial Defence Committee. The Government had no objection to the scheme, but they had to proceed slowly, and cautiously, and it would be a mistake to try and get a premature decision. He had asked the Premier to consider the matter, and he had promised to place it before the Committee on Imperial Defence. He was confident that the great mass of English people did not share the fears and objections to the Tunnel expressed thirty years ago. The present movement in favour of the scheme was not being engineered by the railway companies concerned. He had, in fact, not seen representatives of those companies before he issued his pamphlet. In conclusion, he added that the Lord Mayor of one of the large northern towns had recently wished him success in pushing forward the scheme, as he was sure it would have to be made. He believed firmly that the Tunnel would be made, and would prove more advantageous to both countries than was realized even by its advocates. It would, he maintained, double, treble, or even quadruple the trade between the two countries, and future generations would be surprised that the construction of the Tunnel had been so long delayed—(loud cheers).



His Excellency M. PAUL CAMBON, French Ambassador in London.

Mons. F. SARTIAUX, Engineer of the Northern Railway of France, in his response, said:—

"I am requested by my father, whose important engagements in Paris deprive him of attending this imposing meeting, to express how very glad he would have been to seize this opportunity offered by the French London Chamber of Commerce to draw closer the friendly ties which unite him to many of you, representing public interests, commercial and industrial, in which he is himself engaged. . . . . As to the Channel Tunnel, I need not say what we think of it and our expectations when it is made. I have listened with the utmost interest to the remarks upon the subject from Lord Rotherham and Mr. Arthur Fell, Member of Parliament, and we feel that your Chamber

agrees with the same. In France we are ready in every respect; we are only waiting for the hesitations on this side to be withdrawn, and at the first moment we have notice that this country is ready, we will resume the works already executed on the French side, and which have been duly maintained. There is occasion to rejoice for the present prosperity and the expectation which form the most solid tie between our two countries. By crossing the Channel men and things are not only a means of developing prosperity and comfort; they create between two nations, so well apt to understand and complete each other, means surpassing this sphere of mutual interests already so important, that closely unite minds and hearts, and aid in the moral and intellectual development of civilisation. Our share in this great movement is but small and modest, but we are devoted to it; and you can rest assured that we will neglect nothing to defend it and favour its development, a task in which the untiring efforts of our allies, the South-Eastern and Chatham Railway, will unite with ours. It is with these feelings that in the name of my father, of our Company and my colleagues, I wish you a continuation of your prosperity and raise my glass to the London French Chamber of Commerce."—*Railway News*, 24th May, 1913.

In July, 1882, the Board of the Manchester Chamber of Commerce adopted the following resolution:—

"That this Board is of opinion that submarine communication between Great Britain and the Continent would be of great value to the commercial interests of this country."

Many other resolutions in favour of the Channel Tunnel have been adopted by representative commercial organisations in different parts of the United Kingdom.

THE CHANNEL TUNNEL:

ITS COMMERCIAL AND SOCIAL ADVANTAGES.

Mr. H. S. A. FOY, a Member of the Corporation of the City of London and Hon. Treasurer of *L'Entente Cordiale*, delivered a lecture before the United Wards Club of the City of London, at Cannon Street Hotel, on Wednesday, 1st October, 1913, on "The Channel Tunnel" scheme. The chair was occupied by Mr. Deputy HEILBRETH, and there was a large attendance.

The Lecturer, having given an account of the origin and history of the Channel Tunnel scheme—fully narrated elsewhere in this pamphlet—referred to its engineering and military aspects, its estimated cost, and the present position of the undertaking. Dealing finally with its commercial and social advantages,

Mr. FOY said: Naturally the advocates for the Tunnel dwell upon the boom which the under-Channel Railway would at once confer upon the trade of the world. The two separate handlings of machinery, raw and manufactured material, and perishable and fragile goods now indispensable at Dover and at Calais would henceforth be avoided. Merchandise would no longer be disturbed when once in transit. Acceleration in delivery would be the first result, and a considerable diminution in the percentage of damage would be equally certain to follow. Growth on a large scale in the existing import and export branches of trade might, therefore, be anticipated, and benefit would no doubt be extended to industries the output of which has hi herto been restricted to little more than local areas. The Channel passenger steamship services would be fully maintained, but the submarine railway would always offer an alternative route to persons anxious to avoid the terrors of sea-sickness. During fog and rough weather the Tunnel would attract the great majority of travellers, and at no time would communication between England and the Continent be interrupted.

All the facts go to show that the construction of the Tunnel is not only a work possible of achievement, but that its success is relatively easy and assured. The commercial aspect of the undertaking is not in the least doubtful, for it would enhance very greatly the means of commercial exchange between England and all parts of the Continent, and give increased facilities to the ordinary traveller. It only remains for the enlightened opinion of the English people to realize the future possibilities which the carrying out of this great work will confer. When that stage of development has been reached among the people, military authorities and engineers of Great Britain, the chance of the speedy realization of a great international benefit will not be long deferred.

There will also be a very sensible gain in the number of hours which the journey takes between Paris and London, for, in addition to the economy in the expenditure of money and time for transhipment of luggage, mails, etc., there will be a reduction of at least 25 miles in the railway journey. The net result, therefore, is that the progress effected in scientific and industrial methods since the enforced suspension of the Tunnel works, the short-ending of the railway route to the entrance of the Tunnel on the French side, and above all the advance of electricity, will lead to the possibility of reducing the construction of the Tunnel to a period of seven or eight years, avoiding a great deal of expenditure which, in the earlier years of the project could hardly be foreseen. The improvement surrounding the conditions of the Channel Tunnel project, indeed, carry conviction to the minds of the observers who have studied the problem most closely in all its aspects that the work is not only capable of realization, but that the carrying of it out will be easy and assured of a final success.

If England and France were linked together by a submarine Tunnel (which would in my opinion cement once for all the friendship of the two peoples and put the finishing touch to the *Entente Cordiale*) we should probably see a vital change in many trades, but in none would it be more marked than in the fruit trade. Fruit could then be sent from the south of France and from Spain and Italy in well-ventilated trucks, to reach London in the same truck in which it was shipped. The greatest advantage would be derived from the improved condition of the goods, as the fruit would reach London perfectly sound, not having been shifted since it left the growing district. On arrival here, instead of having to be sorted, as is the case at present, owing to the fact that shipments from various districts and for different firms are mixed up at the port of shipment, each consignment would on arrival in England reach here in the same order as shipped. Thanks to the Tunnel, the sender would simply have to inform the receiver that in truck No. AI 871, for example, he had shipped so many baskets of fruit of such and such a description. The goods might in this case be delivered to buyers' vans without being carried to market for sorting, as is the case at the present time. This would mean a saving of many hours' labour and considerable expenditure of money.

Thus, besides obviating confusion, the Tunnel would have the great advantage of allowing the fruit to arrive in England much quicker than it does at present, as in the busiest season of the year the shipping and unloading from the steamer consumes a considerable amount of time. With the opening of the Tunnel, we should find the fruit arriving here many hours earlier than it can at present. Generally speaking, the fruit which is forwarded to the English market has to reach Paris early in the morning if it is to be forwarded to the port of shipment in time to reach the London market the following day. Supposing the Tunnel to be in existence, goods arriving in Paris at 3 or 5 o'clock in the afternoon could be on sale in London between 6 and 8 o'clock the following morning, thus avoiding all the delays which daily occur when the season is at its height. It is especially at this time that the steamers are delayed in starting, owing to heavy cargoes, and so reach London too late for the fruit to be disposed of to advantage. We readily admit that at present the Cie du Nord and South Eastern Railway and the Bennett S.S. Company (who carry the fruit direct from Boulogne to London) do everything in their power to expedite the arrival of the fruit. Nevertheless, the existence of a Tunnel would do away with much delay and a great amount of labour. It would also prove a big saving of expense and loss, as there would be no claims for missing and pilfered baskets, and would, moreover, allow for a reduction in rates which is badly wanted, if French shippers are to go on competing against the invasion of Californian and other

fruits. In addition to the advantages mentioned, it would also prove a big saving for the empty baskets which have to be returned from England to senders, the handling of these costing a large amount in labour for loading and unloading. The Channel Tunnel would also do away with delays due to fogs, which have proved so disastrous to all trades.

The Calais Chamber of Commerce is of opinion that it is difficult to foretell what will be the importance of the traffic passing through the Channel Tunnel when in working order. It is, however, certain that the cross-Channel traffic will be considerably increased, for it will not fail to absorb a large part of the merchandise transports now in course of transit through the Channel ports, and more particularly those of a delicate nature, which will, by preference, be sent through the Tunnel, in order to avoid the delays and damage inevitable in connection with transport and re-transport by sea. One may at the present time predict, without fear of deceiving himself that early fruits and all food producets will pass through the Tunnel, the facilities and advantages of which will augment the traffic in a proportion that cannot at the present time be calculated.

The following points as regards the commercial value of the undertaking should not be ignored: In the case of fragile goods requiring to be carefully packed, the Tunnel would be of very great importance. The existence of the Tunnel would have the effect of bringing many more foreign customers to our markets who would not otherwise come, as well as fruit and passengers. Perishable articles of all kinds are being sent from Italy all over Germany, as it is easier to send them to Germany by rail than to send them to England by transhipment. An entirely new trade would be created between England and the Continent if the Channel Tunnel were constructed, and in this trade perishable articles which had to be handled carefully would claim a large proportion. Fruit at present comes from Havre, Marseilles and St. Malo in large quantities, and has all to be transhipped. From Great Britain agricultural machinery, which is now transhipped to France, Hungary, and Italy, would have to go through the Tunnel to France. At present fancy cotton goods are sent from Great Britain by the *Grande Vitesse* from Manchester to Paris in a period of from 5 to 7 days, or by *Petite Vitesse*, which occupies from 14 to 30 days. The goods have to be transhipped twice, and they are sent first to London, then by steamer to Boulogne, and then from Boulogne to Paris. If there were a Tunnel, they would go right through.

England is a great commercial depot. Goods come here from all parts of the world. We receive them, warehouse them, and sell them to other countries. Obviously, the facility, as regards means of transit and a reduction of the period of such transit, would be advantageous to us as a country. The sale of Manchester fancy goods would be largely increased, and there would be a modification of tariff. The effect of a large influx would turn visitors to England, and the facilities they would have of observing our prices and comparing them with the high rates which their protective business impose on their respective countries would create a feeling of discontent in the minds of customers and consumers there, and hasten a more liberal commercial policy in and between continental States.

Of course, the more we cheapen our commodities to them, the more likely they are to become commercial rivals with us, but there are a great many classes of goods—products of our own districts, especially heavy goods—which we seem better fitted to make in England than are Continental countries, and we should stimulate the trade in those. Of course, we should never hope to compete successfully with the French, for instance, in commodities which they can make cheaper and better than ourselves, commodities, in fact, which we already import from them. But there are many things which we can sell to them at a very great advantage to ourselves, in a largely increased degree; and I am firmly convinced that the French have only to come over and see what we do, and compare our prices with theirs, in order to make them very much dissatisfied with their position. I think those who visit France very frequently, as I do, cannot help being impressed with the enormous cost of every article used. The smallest thing, dress trimmings or any article of apparel, or of daily consumption, is so extravagantly dear, compared with English prices, that the French would not be content to remain in the same state if they had an opportunity of seeing what we are doing.

The delay and irregularity inseparable through carriage by sea, have operated to the serious disadvantage of English manufacturers and exporters, and the substitution for the present route of one more rapid more punctual, and attended by fewer risks and inconveniences would occasion a large expansion of our trade by enabling it to compete with that of foreign countries under infinitely more favourable conditions. It is also hoped that Dover might seriously rival Hamburg and Antwerp as a Continental port, where passengers and merchandise from a wide stretch of mid-Europe would be shipped or landed to or from America, Australia, and South Africa. Other advantages are obvious. Our manufactured goods for the Mediterranean and the East would go straight through to Marseilles, and save three or four days on the sea passage. The large British import of perishable garden and dairy produce from Normandy and Brittany would be more secure and punctual, as well as cheaper. The cross-Channel passenger traffic, which, according to Mr. Charles Dawbarn, now doubles itself every ten years, would probably increase enormously faster to our advantage in business, pleasure, and intelligence. It is proposed to run an hourly service to Paris alone, apart altogether from the through services to Berlin, Brussels, etc., which do not run to-day by which four trains feed one boat. The services would be continuous.

Finally, in considering the advantages of the Channel Tunnel, people are apt to regard only the services between Paris and London. It is true there would be enormous improvements in these services, as there is very little doubt the trains could run between those two cities in five hours, and, except at certain hours in the night and early morning, it may be assumed that an hourly service would be run in each direction. But this is not the limit of the improvement. Under present conditions, owing to rough seas encountered in the Straits of Dover, it is desirable to have as large a boat as possible. Therefore the carrying capacity of the boats represents three or four train loads.

Under present conditions, however, trains from the South of France, Belgium, Germany, and Switzerland have to be worked into the ports usually in advance of the Paris trains, to connect with the boat which brings the Paris passengers. If there were a Tunnel, the trains would continue to London as separate units. The convenience of this arrangement is obvious. There are many conveniences in the arrangement, besides the disappearance of the transfer of luggage and the delay at the port. Most of these passengers from various ports arriving in London by the same train or different portions of the train, bring large quantities of registered luggage, and there is the necessary delay in sorting out this luggage, and subsequent examination. The proportion of luggage by each train would be so much reduced under the new arrangement that the delay by Customs examination would be very small indeed. In the same way, on the outward journey, instead of as now all the passengers for all parts of Europe arriving at the terminal station in London to go by one service to Calais, the services to Paris, South of France, Switzerland, and Germany could all be arranged at different times. The comfort of passengers would thereby be considerably increased, and the interchange of social and commercial advantages would promote and cement a good fellowship between the great European nations, and especially *L'Entente Cordiale* between France and England.

Mr. T. B. Callard proposed a vote of thanks to the lecturer and said that since he read a paper on the same subject thirty

years ago great progress had been made in tunnelling, and there were many examples showing how speedily the work could be done. He knew something of the fruit trade, and how much it suffered by handling from train to boat. With the Tunnel they would be able to have fruit from France such as they had never had before.

Mr. CHARLES DOUGHTY, in seconding the motion, said the lecturer had treated the subject in a way which went far to disarm suspicion. A debate then took place, the speeches being (the *City Press* stated) for the most part strongly in favour of the project.

Dr. MAGUIRE declared that the Tunnel was only advocated by commercial and millenium exploiters. The security of a nation was not increased by making additional ways by which it could be invaded. Such a Tunnel as that proposed would be "the work of the devil," and he would help to blow it up—(laughter). London was the centre of credit, and it was necessary that she should have the reputation not only for security, but for invulnerability.

Baron EMILE D'ERLANGER referred to the small number of foreigners who visited England every year, and estimated that the influx of people from the Continent, as soon as the Tunnel was constructed, would increase the number tenfold, bringing an additional £26,000,000 a year into the country. He was an Englishman, and his interests, as chairman of the Channel Tunnel Company, would not weigh a feather with him if he believed that the security of the country was to be impaired by the construction of the Tunnel. The only argument against it was one of sentiment, but when the interests of humanity were at stake sentiment ought not to stand in the way. The moats which used to surround the old fortresses were no more obsolete than the "Silver Streak" as a natural defence for this country would be in a few years, when aeroplanes and other inventions were perfected.

Mr. FRANCIS H. DENT (General Manager, South Eastern and Chatham Railway) declared that he would never attempt to force the demand for the Tunnel against the opinions of the military authority of the country. If the Defence Committee said that the Tunnel was desirable, the railway companies and Tunnel companies interested on both sides were ready to make it. There would be no difficulty at all in running the railway services to Paris, in addition to through trains to other parts of the Continent.

Mr. E. AMPHLETT-WHITEHOUSE said he was, on the whole, in favour of the Tunnel, but he was entirely unconvinced that it would be a financial success. Even if each country found £8,000,000, he was not satisfied. Where was the security that the capital would remain reasonably intact in dividend-paying plant? He had heard nothing to convince him that the anticipations of the original cost would not be enormously exceeded.

Mr. F. M. R. DAVIS, while associating himself with everything Mr. Foy had said, thought there was one side of the question which ought to receive further consideration. The time might come when public opinion again ran high in the direction of war fever. The Tunnel might then introduce into the diplomatic relations of this country an element which at a time of crisis would be a grave danger. With the Tunnel there might come a tendency to enlarge the military strength of the country at the expense of our naval strength, and whether that would be a wise thing to do or not he had considerable doubt.

Mr. GAY was sceptical as to whether the project would ever materialise. They did not want John Bull to lose his tight little island. If they wanted to increase commerce why not, he asked, build bigger ships and bigger harbours?

Mr. HENRY DANN considered that Mr. Foy had made too much of the question of the development of the fruit traffic. Fruit was such a light freight that it was comparatively unremunerative and he believed that the fruit would be damaged much more in transit through the Tunnel than it was at present. He urged that, before the Tunnel was sanctioned on this side, England should demand greater reciprocity with the French nation.

Mr. J. ETHERINGTON, speaking as an engineer, said he did not hesitate to state that the Tunnel could be constructed satisfactorily, but that it would cost £20,000,000.

Baron D'ERLANGER, again rising, thought that the Channel Tunnel would dispel the fear of interference with our food supplies in time of war, and would release the Fleet for its proper duties. He believed that the Tunnel would be one of the greatest financial successes the world had ever seen, ranking with the Suez Canal. He was very hopeful that the Committee of Imperial Defence would declare in its favour. He was surprised at the craven fear shown by some military critics, and thought they ought to have a little more confidence in the military and naval forces of the country. The Tunnel, he believed, could be constructed for a good deal less than the £16,000,000 estimated. Calculating the number of passengers at the present yearly rate of increase, he thought that by the time the Tunnel was finished there would be awaiting them, not 1,350,000, but 3,000,000 passengers, and that the estimated income would be nearly doubled.

The vote of thanks to the lecturer having been carried with acclamation.

Mr. FOY said he believed the Tunnel would be one of the greatest means of reciprocity that could possibly exist, and he would be glad to see it for that one reason. He had not the slightest fear that this country's safety would be jeopardised by the Tunnel.

FRUIT SUPPLY TO BRITISH MARKETS.

Messrs. E. A. O'KELLY & Co., Fruit Brokers, Covent Garden Market, have written as follows as to the valuable effect which the Channel Tunnel will exercise upon the supply of fruit to British markets:—

"It is incontestable that amongst the trades which would greatly benefit by the opening of the Channel Tunnel, the fruit trade would certainly come in the first rank.

"To make clear the advantages of the Channel Tunnel, it is necessary to show how the transport of fruit, exported from France, and through France from Spain and Italy, is carried out.

"The fruit is now consigned to Boulogne, Calais or Dieppe, for transhipment to England. On arrival there, it is unloaded and shipped on board steamers whose carrying facilities are not always commensurate with the quantity of fruit which has to be carried across the Channel. Being landed in the English port, it has to be carried from the steamer to the railway truck, and on reaching London it must be partly sorted, loaded in vans, and carted to the various markets to be finally sorted, sold, and delivered.

"It is a well-known fact that rapid transit is most necessary to fresh fruit, but it must be coupled with careful handling. The fact that the fruit, after being despatched by the grower, has to be loaded and unloaded at least nine or ten times before it reaches the hands of the wholesale dealer, shows that the present system fails to give entirely satisfactory results, and that the many times the fruit is loaded and unloaded must affect its condition for the worse, no matter what care may be taken at the various points, where, it must be remembered, the shifting is bound to be done more or less against time.

"If England and France were linked together by a Submarine Tunnel (which would, in our opinion, cement once for all the friendship of the two peoples and put the finishing touch to the *entente cordiale*) we should probably see a vital change in many trades, but in none would it be more marked than in the fruit trade.

"Fruit could then be sent from the South of France, and from Spain and Italy, in well ventilated trucks, and reach London in the same truck in which it was shipped.

"The greatest advantage would be derived from the improved condition of the goods, as the fruit would reach London perfectly sound, not having been shifted since it left the growing district. On arrival here, instead of having to be sorted, as is the case at present, owing to the fact that shipments from various districts and for different firms are mixed up at the port of shipment, each consignment would, on arrival in England, reach here in order as shipped. Thanks to the Tunnel, the sender would simply have to inform the receiver that in truck No. A1 871, for example, he had shipped so many baskets of fruit of such and such a description. The goods might, in this case, be delivered to buyer's vans without being carried to market for sorting, as is the case at the present time. This would mean a saving of many hours' labour and considerable expenditure of money.

"Thus, besides obviating confusion, the Tunnel would have the great advantage of allowing the fruit to arrive in England much quicker than it does at present, as in the busiest season of the year the shipping and unloading from the steamer consumes a considerable amount of time. With the opening of the Tunnel, we should find the fruit arriving here many hours earlier than it can at present.

"Generally speaking, the fruit which is forwarded to the English market has to reach Paris early in the morning, if it is to be forwarded to the port of shipment in time to reach the London market the following day. Supposing the Tunnel to be in existence, goods arriving in Paris at 3 or 5 o'clock in the afternoon could be on sale in London between 6 and 8 o'clock the following morning, thus avoiding all the delays which daily occur when the season is at its height. It is especially at that time that the steamers are delayed in starting, owing to heavy cargoes, and so reach London too late for the fruit to be disposed of to advantage.

"We readily admit that at present the Cie. du Nord, and South-Eastern Railway and the Bennett S.S. Company (who carry the fruit direct from Boulogne to London), do everything in their power to expedite the arrival of the fruit; nevertheless, the existence of a Tunnel would do away with much delay and a great amount of labour. It would prove a big saving to the railways, as there would be no claims for missing and pilfered baskets, and would, moreover, allow a reduction in rates, which is badly wanted, if French shippers are to go on competing against the invasion of Californian and other fruits.

"In addition to the advantages mentioned above, it would also prove a big saving for the empty baskets, which have to be returned from England to senders, the handling of these costing a large amount in labour for loading and unloading. The Channel Tunnel would also do away with delays due to fogs, which have proved so disastrous to all trades.

"E. A. O'KELLY & Co., LONDON."

THE CHANNEL TUNNEL
AND
L'ENTENTE CORDIALE.

Lecture by BARON EMILE D'ERLANGER.

On Saturday, November 22nd, 1913, a lecture on the proposed Channel Tunnel was delivered by Baron Emile d'Erlanger, at a meeting of *L'Entente Cordiale*, held in the Renaissance Salon, Café Monico, Piccadilly.

Sir FRANCIS FOX, M.I.C.E., presided, and there was a large attendance.

The CHAIRMAN, in opening the proceedings said: Ladies and Gentlemen,—It is quite unnecessary to introduce our good friend the Baron d'Erlanger, as he is so well known to the various members of the *Entente Cordiale*, but before I call upon him to deliver his lecture I may say one or two words of introduction. First I would say that he would not be here, I should not be here, and none of us would be here if we thought that this proposal to construct a Channel Tunnel was going in the slightest degree to affect the security of our nation. If, on the other hand, we believe that it would be proved to be the greatest possible benefit to the nation from the political point of view, and from the point of view of international travel, and that it would also be a great safeguard to us, then we should be neglecting our duty if we did not advocate it—(applause).

Why I have been asked to take the chair I don't exactly know. I suppose it is due to the fact that tunnelling has been I was going to say, a pastime for me, for the last forty years. I think I have spent, I was going to say, the greater portion of my life under ground or under water. I have spent a great deal of time both under water and in tunnels under water, and also in tunnels through mountains and in other places, and under the streets of London. Therefore, from the technical point of view, as an engineer, I suppose I am asked to come here to say two or three words on the subject.

First, I may say that the various works that I have been connected with have presented far greater difficulties than we expect to meet with under the Channel—(applause). The simplicity of the work here is remarkable. You have only got to look at the sections which hang on the wall, and you will see that there was a heading driven for over a mile, terminating right away under the Channel. It was unlined—that is, the bare chalk was exposed. Yet it was so dry that ladies were able to go down in their silks and satins and be carried or walk to the far end without encountering a single drop of water—(applause). I am told that the total amount of water that came in was such that a small 4-inch pump working for about eight hours during a fortnight, or even during a month, was able to deal with the whole of it.

Then as to the safeguards during construction, I may point out that we had far greater difficulties to deal with in making the Simplon Tunnel through the Alps. There we had to deal with hot water and hot rocks. The rocks were so hot that when I bared my arm and put it into one of the bore holes ready for blasting the sensation was like as if I put it into an oven. Here we shall have nothing of that kind. There we had scorching rocks and scorching timbers. Here there will be nothing of the kind. Nor shall we have the same difficulties that we had from 1880 to 1886, when driving a tunnel at Liverpool under the Mersey, which there is practically the sea, with a hundred feet of water, and the Channel Fleet floating on it over our heads. The progre s made in tunnelling since those days will minimise the difficulties enormously, and bring them down almost to zero. I should have no hesitation in undertaking to drive a tunnel from England to France because we know practically the whole way what the strata amount to. But I did not come here to give a lecture on engineering. We have come to hear the Baron. He will deal with the matter in a much more general way than I, but I thought that these few words might be of some guidance to us in coming to some conclusion—(applause).

Baron EMILE D'ERLANGER: Ladies and Gentlemen,—My first duty is to thank the Chairman for the kind allusions he has made to me. I should preface my remarks by telling you that in the course of my life I have received a great many lectures, and deserved a great many more, but I never had the opportunity of delivering one before, and I will therefore ask you to extend to me your kind indulgence, as I am afraid I shall not come up to your expectations in the task which has been allotted to me. It is a very great privilege for me to speak at a meeting of the *Entente Cordiale*, because the *Entente Cordiale* is a work of peace and harmony between two great nations, and because although the Channel Tunnel is often referred to in the light of its dangers or advantages in the event of war, I would like to point out that the Channel Tunnel is the monument of peace made to consolidate the friendship between those two great nations, and extend it to those other countries which adjoin them—(applause.)

There is nothing so likely to promote peace in this world as an interchange of communications between peoples, so that they may learn to know each other better, and to better appreciate each other's qualities. One of the first things which are necessary in delivering a lecture of this kind is to give you some idea of the Tunnel itself, and explain the causes that make it so easy of construction with the engineering facilities that nowadays are at our disposal. Everything in this world—and when I speak about this world I am not speaking about this tiny little earth, but the whole world in its larger sense—is subject to eternal motion, and the ever return of known cycles. Everything that is has been before in time immemorial, and we know that many hundreds of thousands of years, perhaps many millions of years ago, the surface of the world was totally different from what it is to-day. Where we have England to-day the whole of it, or almost the whole of it, was at some distant time covered by the sea, and then this sea disappeared and the earth which was below the sea rose, and you had a formation which was more or less like England at the present moment. There was, however, one very vast difference. England at that pre-historic time was

connected with France, so that you had not the Channel as it is now, but at that time there was a sort of bridge between England and the Continent just the same as there was also a bridge between the African continent and the continent of Europe. This is proved by the fact that in the course of many works that have been undertaken in England at different times, in laying open the sub-strata of the earth there have been found the remains of those antediluvian animals which then inhabited the globe, and which found their way from the centre of Africa right through the European continent into the most northern parts of England. Later on, in more recent times, the action of the Atlantic Ocean and the North Sea destroyed by erosion that bridge between England and the Continent, and gave us instead what is known to-day as the Channel.

This erosion is still going on, and it has been calculated that the coast of France and the coast of England are losing every 100 years something like 20 yards. Let us then remember that in millions of years to come occurrences such as those that took place millions of years ago will again take place, and France will be again under water up to Paris, as it was in those days, and England will be a much smaller country than it is to-day. It may seem to you that the suggestion is far-fetched, but it is not as far-fetched as you might think, because it is from the knowledge of these transformations that have taken place that engineers are able to have some idea of the formation which is hidden from the eye of man, and consequently first of all to speculate on what the underground strata are, and afterwards discover them and prove that they exist exactly as they have divined them.

Very fortunately for the future construction of the Channel Tunnel it has been proved that the sub-strata underneath the Channel are of perfect continuity and composed of material, through which it will be very easy to bore. This material is absolutely continuous from one side of the Channel to the other. You must not think that the work of proving these facts which I have mentioned has been of one day's duration. The work which has been going on in connection with the construction of the Channel Tunnel is over fifty years old. There has been during all that period almost incessant work, so as to provide every kind of data which it was necessary should be known in order to insure that the construction of the Tunnel would be a sure and speedy operation. The work has been done by most eminent engineers, both French and English. On the French side I might mention M. de la Parente and others, and on the English side Messrs. Hawkshaw and Brady, and now we have their distinguished successor and colleague, Sir Francis Fox—(applause).

The whole of the bed of the Channel has been fully reconnoitred. Over 7,000 soundings have been taken, and as you will see, it has been established beyond doubt that there is a stratum of grey chalk extending from the coast of England to the coast of France, that this grey chalk is absolutely impermeable to water and easy to bore, and that it is only a question of time and money to put the Tunnel right through from shore to shore —(applause). As has been explained to you by Sir Francis Fox, not only have these soundings been taken but more than 40 years ago extensive works were carried out on both sides of the Channel, and galleries have been put under the sea for a distance of over 1,000 yards on each side, thus proving how easy it is to work through that rock, and how absolutely safe and free from percolation of water was that stratum through which the Tunnel would be made.

It is very curious to see the scepticism of some people about the possibility of being able to make a Tunnel under the sea, when we come to consider that the idea of a Tunnel is almost as old as the world, and that in the time of Semiramis there was already a tunnel pierced below the waters of the Euphrates, and putting one side of the great city of Babylon in communication with the other. However, the existence of such a piece of engineering work might be doubted by some people, and if people want to see work under the sea, or under the water, there are plenty of opportunities for them to do so. In fact, in their everyday life in London they go under the Thames. There has been for a long time, as explained to you by Sir Francis Fox, a tunnel under the Mersey, and there are hundreds of miles of galleries under the sea in the coal-fields of England, where the sea coal is gained, and those mines which are under the sea are considered among miners as the safest almost of all the mines in Great Britain.

I would like now to say a few words about the Tunnel itself, and to give you an idea of the magnitude of the work, and explain how it is to be used. The Tunnel which is to be under the Channel will extend from the coast of Dover, and will originate somewhere in the neighbourhood of Dover Castle. From there it will dip gradually under the Channel, attaining a maximum depth under the bed of the sea of some 100 yards in the middle. It will then rise gradually until it reaches the French coast near Sangatte. There will be very little water, we believe, in the Tunnel at any time, because we have every reason to believe that the strata of grey chalk which we are to follow in the construction of the Tunnel will be found to be faultless. However, on this point we must be quite prepared to see our expectations mistaken, and I want to point out to you that if there are any faults in the chalk they will not disturb the engineers one iota. Means have now been discovered to get through such faults without difficulty, either by the freezing or by the tubing process, and if any faults should exist they will be overcome without any danger either to the Tunnel itself, or, what is more important, to the men who are underneath the sea constructing the Tunnel.

I have to explain to you that the Tunnel will have a concave form. As you will see from the plan, it falls from the coast of England towards the centre, and rises at the end towards the coast of France. Therefore, no matter how small the accumulation of water was, still in time even the ordinary sweating of the Tunnel which is found in all parts of the world would be sufficient for water to accumulate in the bed of the Tunnel which it would be difficult to pump out, and, consequently, when the works are being constructed the main Tunnel, through which the trains will pass will be built in a concave form, but there will be a gallery driven underneath the Tunnel in convex form. That is to say, the entrance of that lower gallery on the English side will be below the bed of the Tunnel; it will rise towards the Tunnel above in the middle of the Channel, and it will fall again and be below the entrance to the Tunnel on the French side. The result will be that the waters will find their way from the main Tunnel into this convex tunnel beneath, and will flow to each end, and then be pumped out by means of centrifugal pumps.

The Tunnel itself by which the trains will pass will consist of two large tubes 18 feet in diameter. These are shown on the diagram which you see before you. They will be connected by a gallery. This gallery will be sufficiently long to insure that one tube shall not be affected by the other. That is to say, that the power of resistance of each tube shall not be affected by the proximity of the other. In the design which is shown on the plan before you, you see the sections of the tubes, and you also see the drainage gallery which is below them. Of course, as the section is but a small one, the drainage gallery appears to be horizontal, but if it were taken over a much longer distance it would appear to you in a rising form. The advantage of making the drainage gallery is that it will be of much smaller diameter, and can be put through with greater quickness, and from the drainage gallery we shall be able to attack the main Tunnel for the purpose of its construction in many different places, therefore hastening the time of its completion.

The whole problem and the whole difficulty of the Tunnel

resides in its length. This will be best illustrated by telling you that the Simplon Tunnel, which is the longest tunnel in existence is, I believe, from 20 to 21 kilometres in length, a kilometre being a little over 1,000 yards. The total length of the Channel Tunnel from end to end will be some 50 kilometres. I am using kilometres instead of miles because my friend Sir Francis Fox is a very great advocate of the decimal system—(applause)—and in his presence I am afraid to give any other measurements. It is the distance of the Tunnel which constitutes the only difficulty, because you will understand that where we are excavating every day at the rate of some 4,000 cubic yards of earth, it is not a small problem to be able to haul all that debris out through one single tunnel. In fact, it has been calculated that the small railway line which will be laid in the construction tunnel that will become hereafter the drainage gallery will have to convey every day about 1,200 workmen to their fields of operation, and will have to deal with about 100 trains carrying in material and bringing out the debris.

Of course, you must take into your calculation that I am not dealing with one single egress, that in constructing the Tunnel the work will be constructed in parallel sections, and uniformly both from the French coast and from the English coast, and that therefore there will be a double movement from the very initiation of the works. The engineers both on the French and English side are absolutely in accord as to the means and processes to be adopted to excavate the Tunnel, and indeed I should not be doing justice to our French neighbours if I did not avail myself of the opportunity which is now presented when expressing my great appreciation of the work done by Sir Francis Fox to refer to the work of his eminent colleague in France, M. Sartiaux, chief engineer of the Chemin de fer du Nord. He has studied the problem for many years in all its bearings, and he has written upon it the most lucid of all articles in the *Revue des Deux Mondes*. This has been translated into English, and I should recommend everybody here present who is interested in the subject to peruse it.

When the Tunnel is constructed I need not say that the trains will be moved by electricity. In fact, I marvel at the boldness of the engineers who thought of working this enormous Tunnel 50 kilometres in length by means of steam, electricity being an unknown factor in those days. To-day the problem of electric traction is entirely solved, and it will be easy with the big electric station, if there is to be only one in England, or with two electric stations if there is to be one on each side, to move as many trains as is desired in a day without interfering with the air that is in the Tunnel, and at the same time to pump out the water from the drainage gallery, and also pump in the fresh air which is necessary for the comfort of the passengers.

The benefits to the purely travelling community will be enormous. Far be it from my mind to speak about the advantages of being able to cross the Channel without being seasick. It is only the enemies of the Tunnel who can find no better reason for the construction of the Tunnel than that it will get rid of some little discomfort which is caused to them by the sea. Unfortunately to persons who are obliged as I am myself to cross the Channel every now and then in any circumstances of weather more often than we like that is not the problem, but added to the discomfort which it involves when one is obliged to go to the Continent, there is the loss of time which is something enormous. The night journey is almost an impossibility, anyway frequently, save to the youngest and strongest of men, and it takes the whole day to go from Paris to London. When the Tunnel is constructed we shall be able to go from London to Paris, and therefore to any of the other great centres in very much less time than we have to spend at present. In fact, we shall be able, if we have business in Paris, to start early in the morning for Paris, have luncheon there, transact our business comfortably, return from Paris, and sleep in our beds at home in London that night.

What this means to a business community where the business relations are so intense and the interests so great as they are between the Continent and England is only appreciable by business men who know the volume of the trade which is done and the saving in money and time that would be involved by the existence of these facilities. There is no doubt to my mind that the difficulties of communication between the Continent and England affect greatly the prosperity of England. Of course, you will tell me, and I know, that England is very prosperous, but I am not one of those who say "Let well alone." The moment you halt in anything in life it goes backwards, and the prosperity of this country must be increased, and the duty of every citizen of this country is to work for the increase of this prosperity if you do not want to see it go back and disappear.

In 1911 there were 2,800,000 passengers between France and Germany, with a combined population of 100,000,000, and 4,350,000 travellers between France, and Belgium, and Holland, with a joint population of 50,000,000. Contrast this with the United Kingdom, where the figures show how the difficulties of communication between the Continent and England militate against the prosperity of England. The population of the United Kingdom is about 48,000,000, and the population of the continent of Europe is about 200,000,000. Between the United Kingdom and the Continent, with all this vast population, there is a total annual movement of passengers of only 1,650,000, and of these 1,650,000 people, something like 80 per cent. are Englishmen. That proves how very small is the percentage of continental people who come to England. Why don't continental people come to England in larger numbers? It is simply because they are deterred by the sea passage. If there are 1,650,000 people passing between the United Kingdom and the Continent, and of those 1,650,000 80 per cent. are English and only 20 per cent. are continental people, and if you admit that the expenditure of each traveller who comes to England or goes from England to the Continent is as has been computed, about £20 per head, on the average, you will find that England loses every year, or is drained to the tune of something like £26,000,000 sterling, representing about 10 per cent. of the total economies of the nation in the year.

If you redress that balance, and if you get about as many continental people to come to Europe as there are English people who go to the Continent—which ought not to be difficult seeing that on one side of the Channel you are dealing with a population of something like 200,000,000 people, while in England you have only some 40,000,000 people, and the 200,000,000 people ought to give as many travellers coming to England as the 40,000,000 give going to the Continent—England would be benefited to the extent of something like £26,000,000 per year.

Is there any reason why, apart from the difficulties of communication, the continental people should not come to England? I don't know any. I am an Englishman myself, but I have visited a great many countries abroad, and I have never found one, I will not say to equal, but to surpass England in the beauty of its cities and the interest of its museums and its monuments, while I defy you to equal it in the activity of its commerce, and the facilities which it offers for the acquiring of goods. It is a very remarkable fact that apart from the question of travelling the total amount of goods exchanged between France and England is 12,543,000 tons in a year. Out of that 12,543,000 tons, 10,151,000 tons are represented by coal alone, so that the total exchange of goods between France and England, of the general goods only, amounts to 2,392,000 tons, which are a mere bagatelle; and it is simply because there is not sufficient interchange between the commercial people of England and France that the people of the Continent do not come over here and do not know what our goods are, and consequently do not buy.

We have heard people say that England would suffer com-

mercially from the construction of this Tunnel because it would affect the mercantile marine of this country, and that as shipping is one of our largest industries, if shipping suffered the whole of England would suffer. Such arguments are put forward by people who do not know their subject, because the amount of goods dealt with by our shipping industry is enormous. It amounts to some 189,000,000 tons, and in comparison with this the 2,392,000 tons of ordinary goods which are exchanged between France and England would be a mere fleabite, even if the whole of these goods were carried by the Tunnel. The fact, however, is that the construction of the Tunnel would interfere only to a very small extent with the carriage of these 2,392,000 tons of goods, because it is only the goods of small bulk, and comparatively high value which people could afford to send by the Channel Tunnel route, as carriage by that route will be more costly than carriage by sea. Consequently, if we count upon any goods traffic from the Channel Tunnel, apart from the small quantity which we would take of the goods which already pass, our traffic will be in the main from the new commerce which we would create for England by this improved means of communication, so that the amount of English shipping will not be reduced, but will be greatly increased—(applause).

I have now dealt to some extent with the chief questions appertaining to the Tunnel, and I should like to say a few words which may interest you about the history of the Tunnel. The history of the Tunnel is not of very remote date. A tunnel of that magnitude being absolutely beyond the engineering possibilities of early ages, was consequently almost beyond their conception, and it was only in the beginning of the last century that the idea of the Channel Tunnel was first mooted. It was then put before Napoleon the Great, who was at that time First Consul, by a French engineer. At that time France and England were at peace, as the war had stopped after the peace of Amiens. The idea was keenly taken up by the Emperor. He said it was one of the great things which he hoped the two nations would do together. Unfortunately, the peace was not an enduring one, and although I am speaking before an Anglo-French community, and notwithstanding the immense admiration I have for the great Emperor, I am obliged reluctantly to admit that the blame was not on this side, but I will ask you to think what would have been the progress of the world if instead of the twelve years of carnage that succeeded the peace of Amiens, with the destruction and bloodshed that filled the intervening years, the two countries had been united as they are united to-day, and it is only upon the dawn of this new epic of friendship when these two nations are beginning to understand each other not only as individuals, but also as nations that I have felt that it was wise to appeal to my fellow citizens, and to recommend to them the carrying out of that great scheme which was then advocated by the great Emperor.

I have left one side of the question entirely out of consideration to-day, and that is the military side. There has been a feeling in this country that the Tunnel might affect the national security. Indeed, after the first great effort for the construction of the Tunnel was made, shortly before the Franco-German War of 1870, the project received the support not only of Frenchmen, but also of Englishmen including those of the highest standard. Queen Victoria and the Prince Consort gave it their support. The question was taken up diplomatically by the two nations, and a protocol was signed between England and France for the construction of the Tunnel. Unfortunately, after all the diplomatic arrangements had been made between the two countries, a scare broke out in England. I don't say that this scare originated entirely of its own self. Unfortunately at that time the South Eastern Railway and the Chatham and Dover Railway, which were competing for the mastery of the traffic across the Channel were antagonists, and, more unfortunately still, the destinies of those two countries were governed by very strong, but very obstinate men, and each wanted to have the whole benefit of the Channel Tunnel for his own company. Sir Edward Watkin at that time rather got the better of it, and the Chatham and Dover Company thought that if the South Eastern Company was to have the whole benefit of the Tunnel it should not be constructed at all. A little scare about the security of England was engineered, and once a destructive snowball of that nature is started you never know where it will stop. I think it has taken something like 50 years to stop it, but I hope that it is stopped to-day—(applause).

The works which had been begun on both sides of the Channel, and which showed how easy it was to construct this great undertaking, had to be interrupted by an order of the Board of Trade, and ever since then the matter has remained in suspense. We, however, on this side of the table at least, have never ceased to fight for its achievement, and even should we be defeated to-day, we would not despair, and we would not give up. We know whether, I won't say Sir Francis Fox, but even my humble self ever sees the Tunnel constructed that when an idea is sound, and when it is true, it will endure and it will outlive all the vicissitudes of fortune. It may wither in the blast of cold winds, but it will take root, and one day when it is shone upon by the beneficent sun it will ripen into maturity, and you may be as certain as that I am standing here to-day that even if we are defeated to-day in our effort to construct the Channel Tunnel, that monument which will cement those bonds of friendships which exist between France and England, those bonds of friendships which have been forged by *L'Entente Cordiale* who have invited me to speak to-day, this work will be constructed, and it will strengthen our friendship still further. A few years' time in the life of a nation or in the history of a project like this is nothing. I hope that we shall see this work accomplished, but if we do not see it accomplished our successors and our descendants will—(applause).

Sir Francis Fox: I have been asked to supplement the Baron's remark on two matters. He referred to the quantity of earth which would have to come out of the Tunnel and the drainage that would have to be dealt with. This is a problem which we can easily face. Another question is the ventilation of the Tunnel and the difficulty here is not nearly so great as that which is dealt with every day in our collieries where they have to encounter the problem presented owing to the existence of explosive gas. In reference to the use of the Tunnel in the event of a war the opinion of some of our ablest military men is strongly in its favour. Perhaps I had better not mention the names, but you may take it from me that some of the leading authorities in the country are strongly in favour of the project. They know that if in the event of a war the trade routes by which we bring our food supply across the ocean were interfered with even for a short period, the knowledge that we had the Tunnel at our command to procure supplies of food through France and thus prevent a shortage of supplies would go a very long way to encourage our nation, for we should know then that the interruption of our food supply owing to the disturbance of the ordinary routes would not be effective. That has been urged in very strong language by a person occupying a very leading position in the country.

The interruption of our trade routes by sea even for a fortnight, he has pointed out, might produce such a rise in the prices of food as to bring about a panic, but if the Tunnel were in existence such a result would not ensue. The mere knowledge of the existence of the Tunnel would suffice to prevent any panic. The Baron referred to M. Sartiaux, the able French engineer, and it is but right to say that I have never come across a more gentle, a more generous, or a more able man than M. Sartiaux. And yet all the time you hardly ever see him. He never goes to any function or dinners or meetings, or anything of the kind, but he is absolutely correct in all his conclusions—(applause).

The only other matter to which I wish to refer very briefly is

the question of train ferries. Some people say that a train ferry is the correct solution of the problem of Channel transit. You may have ferries across the Baltic, where there is no rise or fall of the tide worth speaking about, or in the North American lakes, where they have no tide, but to establish a ferry across the Channel, and to face a rise and fall of 18 or 20 feet of water is too great a task. Coupled with that, there is the difficulty of the weather. As M. Sartiaux says, the question of train sickness makes it absolutely impossible. It is bad enough to be seasick on a steamer. It is ten times worse to be seasick in a train where you have got no facilities—(laughter)—and it would be very disagreeable for travellers who came afterwards and who occupied the compartments in which persons had been sick—(laughter).

Lord ROTHERHAM: Ladies and Gentlemen,—I have been asked to propose a vote of thanks to Baron d'Erlanger for his admirable lecture this afternoon, and I fulfil that task with an uncommon degree of pleasure. I am myself no new advocate of the Channel Tunnel, for I remember years ago it fell to my lot to have charge of the Bill in the House of Commons, which would have been the first step towards the construction of the Tunnel, and I know well the circumstances which obtained on that occasion which induced me not to press forward the Bill any further. I am glad to know that those circumstances have to-day changed entirely, and I think that the prospects of the Tunnel have never been anything like so bright as they are just now. The Baron referred in his lecture to the fact that electrical power had been introduced much more largely during the last few years than was formerly the case, and I could not help being reminded of the use of electricity in another direction. We have nowadays what is known as cooking by electricity, and I remember an engineer who was at one of the restaurants in the city telling me that he ordered beef-steak for his luncheon. When it was brought to him the waiter said—"That, sir, has been cooked by electricity." He found it was a little underdone, and he said: "Take it away, and give it a couple more shocks"—(laughter). But I don't think there will be any dearth of electrical power when we get the Tunnel constructed, and have things conveyed by that means.

Since this proposition was first broached the engineering difficulties have been dwindling all the time, so that to-day it would be infinitely easier for our engineers to construct the Tunnel than it would have been had they embarked on the task years ago. I am glad to know, too, that the military objections to-day are very much less formidable than they were years ago. Surely no one here will dissent from what I am about to say in regard to the *Entente Cordiale*. I believe that the *Entente Cordiale* between this country and France has come to stay—(applause)—and I think that the construction of the Tunnel would afford the greatest possible guarantee of the permanence of that *entente*. We have had some very interesting statistics given to us as to the enormous benefits that we in this country are likely to derive from this Tunnel. The number of visitors from England to the Continent I believe would be increased if the Tunnel were to be constructed, but the number of visitors from the Continent to this country would be increased in enormously greater ratio if the Tunnel were constructed.

First of all the Tunnel would tap, as we have heard from the lecturer this afternoon, an infinitely larger population on the other side of the Channel than on this side of the Channel, and we are firmly of opinion that if we had this Tunnel the number of visitors from the Continent to this country would be so enormously increased that there would have to be very quickly a great addition to the number of hotels in this country for giving them a hospitable welcome. Undoubtedly, it will mean additional custom for the shops. That, of course, goes without saying. I don't pretend to enumerate all the advantages that the construction of the Tunnel would afford, but I believe that you all feel deeply grateful to Baron d'Erlanger for his admirable lecture this afternoon, and to Sir Francis Fox for his services in the chair, and we appreciate very highly the fact that this subject has once more been brought prominently before us, and I feel firmly convinced that during the next twelve months there will be a very substantial increase made in the hold that this question has upon the public intelligence, and upon the public mind of this country—(applause).

Mr. CARSON, K.C.: Ladies and Gentlemen,—I wish to associate myself with the vote of thanks which Lord Rotherham has proposed to you. He has told you that he is a strong supporter of the Tunnel, and I have no doubt that the Baron d'Erlanger will be pleased if he knows that the vote of thanks to him is supported by one whose opinion may be of a different character. There may be many here whose opinion is doubtful, and there may be many here whose opinion is against the Tunnel. But whatever we think, we are all grateful to Baron d'Erlanger for having given us so much interesting information about a subject which interests us all. He has touched upon questions which are doubtful, which are burning, and may again become burning. But at present we can speak of them coolly, and whatever we may think about them, I feel sure that you are all immensely interested in the information and the conclusions which he has laid before you. I wish to second the vote of thanks.

The motion was put, and carried unanimously.

Baron EMILE D'ERLANGER: I beg to thank Lord Rotherham and Mr. Carson for the kind words which I have so ill deserved indeed. In delivering this lecture I have left out a great many things which I ought to have said, but I hope that I have said none that I ought not to have spoken. Lord Rotherham has told us that a great change of public opinion has taken place all round, and I have seen signs of that change of opinion myself. The world is full of coincidences, and a very curious fact is that I wanted to make sure this morning as to where I had to speak, and I came here about one o'clock. As I came out a gentleman tapped me on the shoulder and said, "What are you doing here at this time of day? You ought to be in the City."—(laughter). I said, "Perhaps I am here to do better business than in the City." The man I was talking with was Lord Weardale, who is chairman of the ferry boat scheme. I said, "I have come to speak about the Channel Tunnel." "Well," he said, "you will never get the Channel Tunnel through. I will bet you two to one you will never get it through the Houses of Parliament." I said, "I have not done any good business for a long time. I will take your bet"—(laughter). There must be some reason for my confidence in the ultimate result. Indeed I have great confidence in the immediate result of our endeavours to have the Channel Tunnel constructed. Our confidence is based on the fact that there is absolutely no shadow of danger to this country from the construction of the Tunnel, that the matter is now before the Committee of Imperial Defence, and that I am absolutely convinced that they will come to the conclusion that if the *Entente Cordiale* is not to be a mere shibboleth, a mere vain word, the construction of the Tunnel is a strategic necessity—(applause).

I have dealt very slightly with the question of the safety of the Tunnel, and I think that that has been one of the great omissions in the lecture which I have delivered, but I refrained from dealing with these and other matters because I was afraid of trespassing on your patience too long. I may, however, mention that we have let the War Office know that any precaution they deem necessary to safeguard the Tunnel against the possibility of imaginary or real risk would not interfere with the construction of the Tunnel. There are so many devices by which the Tunnel can be protected from misuse that I cannot conceive the most remote possibility that the Tunnel should escape disablement in the case, I will not say of necessity, but of the

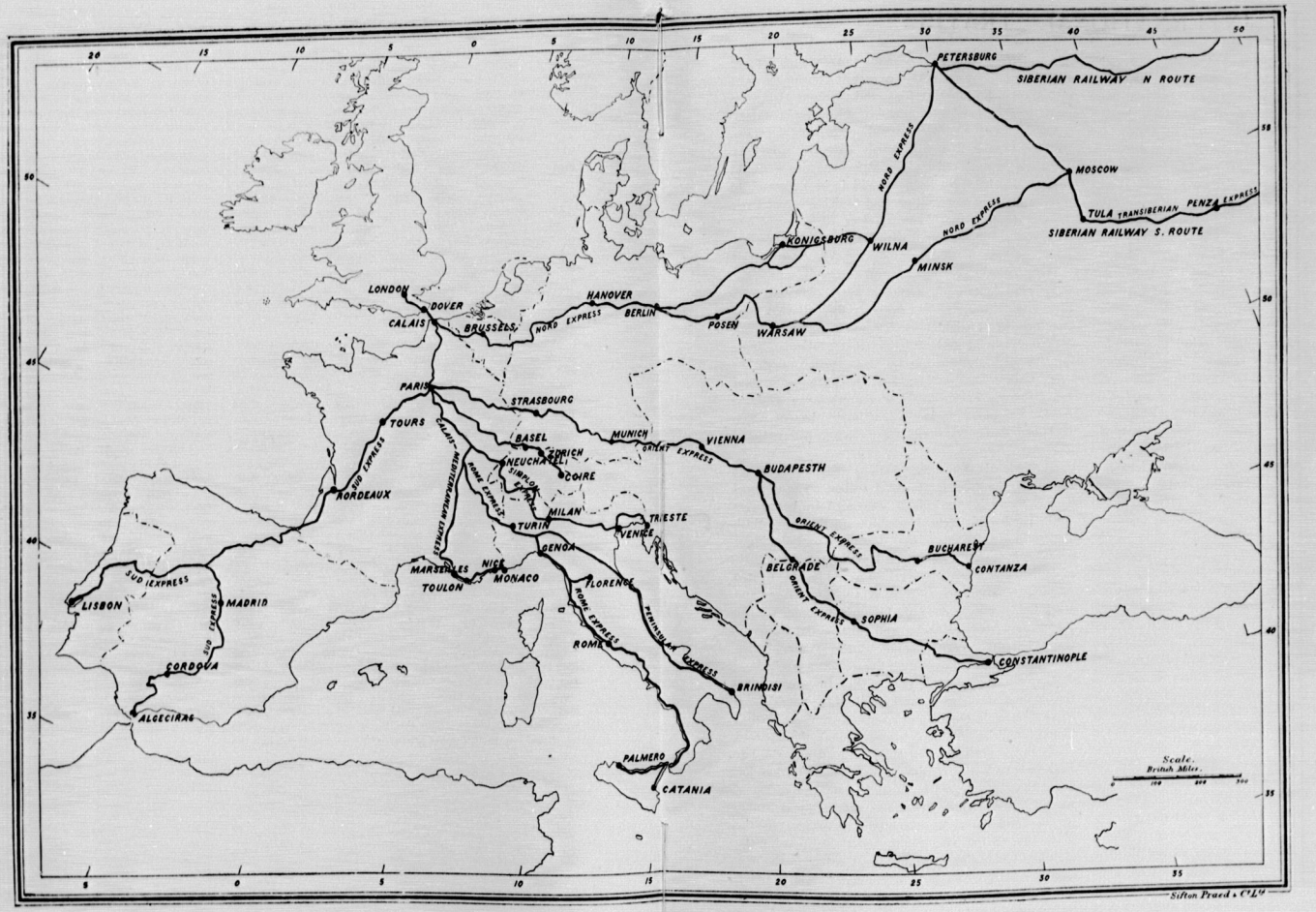
slightest fear that it would be necessary. One great safeguard would be that the Tunnel should be worked by one single power station situated in England far in the rear of the great line of forts which surround and which protect the important naval station of Dover, so that it could be shelled at a moment's notice, or blown up at a moment's notice; and of course, once the motive power had been destroyed, there would be no possibility of any trains being moved through the Tunnel. But that is not the only device. The entrance to the Tunnel will be through some miles of land tunnel, because the entrance to the tunnel will be beneath the forts of Dover, and that portion of the Tunnel which is at Dover can be destroyed without jeopardising the great work which is beneath the Channel, and it would be destroyed in such a way that while the Tunnel could not be used until the damage done was repaired that damage could be repaired in a few months at a cost of a few hundred thousand pounds, which would be nothing in comparison with the cost of the entire Tunnel, some £16,000,000. No officer would hesitate if he thought there was the slightest danger to destroy a couple of miles of land tunnel that could be repaired at a cost of a few hundred thousand pounds, while it is quite natural to think that he would hesitate to assume the responsibility of destroying an immense monument of human industry which had cost £16,000,000.

There is no doubt about it that the danger which it is feared would arise from the existence of the Tunnel is purely imaginary, and that the opposition is based upon a sentiment, upon an indefinable sort of creepy feeling, such as we have in connection with the subject of ghosts, although we don't believe in them. But you have to bow to the requirements of human nature. You have to meet sentiment just as you have to meet reason, and I am convinced that we can give ample security for devices to render possible the partial destruction or, if necessary, even the total destruction of the Tunnel, so that there cannot in the mind of any reasonable person be any question as to the possibility of any danger arising from it. In the event of war, as Sir Francis Fox has pointed out, it would be a great advantage to us to know that our fleet was untrammelled in its permanent duty of finding and destroying the enemy. If our fleet, the overwhelming superiority of which is being questioned more and more every day, because its ratio of superiority is decreasing as the fleets of other nations are increased, has to engage in war, it would be a great advantage if the whole of our fleet can be concentrated upon the work of finding and destroying the enemy. This is only possible if our fleet is not hampered by having to protect our food supplies. We consume in England something like 45,000 tons of imported food supplies every day, and you can think what a vast army of mercantile ships it takes to bring these large supplies into the country. If the Tunnel existed, and if it were necessary—it would never be necessary, because we would probably lose only the use of a part of the ports to which our imported supplies are brought—we could, through the Tunnel, if it existed, import the whole of that food supply into England unknown to and unseen by the enemy. Therefore, we would protect ourselves against the possibility of a disgraceful surrender which we might have to make if we were compelled by famine.

I do not like talking about the Tunnel from the point of view of war and military questions, first of all because it is not in my province, and in the second place because I hate to see the Tunnel regarded from the point of view of military questions and the point of view of war. I want to look upon it in its aspect as a benefit to trade, and as a means of civilisation both to ourselves and to the countries with which we should be brought in contact. We have got good to give to them, and they have got good to give to us, and it is by this inter-communication that we shall both gain what each has got to give the other. But I will say that if there were a war, and if we had to take part in that war we should necessarily be allied with France, and it would be an untold advantage to us to be able to exchange troops with France unknown to and unseen by the enemy, instead of having to confide our troops to transport ships which would be the objective and target for every airship and aeroplane coming from places on the North Sea. It is hardly possible to conceive that with the progress that is being made nowadays in the conquest of the air it would be feasible to send over any number of troops to-day by transport ships without having some colossal and disastrous losses to this country, and the only way in which you can obviate such a condition of things is by having some means of communication with the Continent which cannot be interfered with by the enemy. Such a means is provided by the Channel Tunnel—(applause). Again I beg to thank you most cordially for your vote of thanks.

Professor SPIERS: Ladies and Gentlemen,—In proposing a vote of thanks to Sir Francis Fox for presiding at this meeting, I may say that though we have heard a most admirable lecture from Baron d'Erlanger, a few words of thanks are due to Sir Francis for his kindness in coming to preside over this meeting. Though the Baron has told us that he has been lectured most of his life and less than he deserved, I am sure he would stand as a model for a great many lecturers—(applause). I have listened to him with the greatest of pleasure. At the same time Sir Francis Fox's presence has been of the greatest value to the Society, and it has given the hall-mark of his great engineering authority to a scheme which is dear to every idealist who is in favour of peace in the world, and more particularly to the patrons of the Society whose first and most sincere wish is to see France and England more closely and more intimately connected. I have the greatest pleasure in proposing a vote of thanks to our Chairman—(applause).

The CHAIRMAN: I am much obliged for the vote of thanks, but it was only a pleasure for me to come here and to be brought into contact with the members of *L'Entente Cordiale*.



THE GREAT TRANS-CONTINENTAL TRAINS WHICH WILL RUN DIRECT TO AND FROM LONDON BY THE CHANNEL TUNNEL.

This Map has been specially prepared to illustrate the advantages which the Channel Tunnel will confer upon International travel.

WHAT THE CHANNEL TUNNEL MEANS TO INTERNATIONAL TRAVEL.

From the passengers' point of view, the construction of the Channel Tunnel would be an ideal achievement. It would enable the regular traveller to and from Paris —and there are many persons who make the journey between the English and French capitals more than once a week nearly the whole year round—at the close of a day's business, to attend a theatre in London, and after supper to take his place in a sleeping car at Charing Cross, and to reach Paris at eight o'clock the following morning, having bath and breakfast leisurely in the train before starting upon the day's business. The same evening he could visit one of the French places of entertainment, and having supped at hotel or restaurant, go to bed in the sleeping car, which would leave the Gare du Nord at 1 a.m. Bath and breakfast would again be enjoyed in the train, and he would be ready at the unusually early hour of nine o'clock to enter upon another day's engagements in London. This programme would represent an enormous saving of time, and would, moreover, enable the business man having interests in France as well as in England to devote a whole day to work either in Paris or in London, and to pass the evening in amusement, without experiencing the least discomfort during the journey in either direction.

Official records prove conclusively that many thousands of the inhabitants of the large cities on the Continent are, by reason of the Channel passage and its somewhat uncertain conditions, reluctantly debarred from visiting London. But once the Channel Tunnel were made, through trains, including restaurant and sleeping cars of magnificent design would daily run into Charing Cross from every capital in Europe, the times of arrival morning and evening being arranged to suit the general convenience. At present, passengers by the Orient Express for Vienna, the Near East and Constantinople must leave London at 9 a.m., and scurry across Paris, with bag and baggage, to catch the express at the Gare de l'Est, international conventions requiring that this train shall leave Paris not later than 7.13 p.m. But if the Channel Tunnel were in existence, the Orient Express could start from Charing Cross at mid-day, and yet maintain the schedule now in operation through Paris to its destination. It is easy to conjure visions of what a 12 o'clock noon Orient Express would mean in the world of travel!

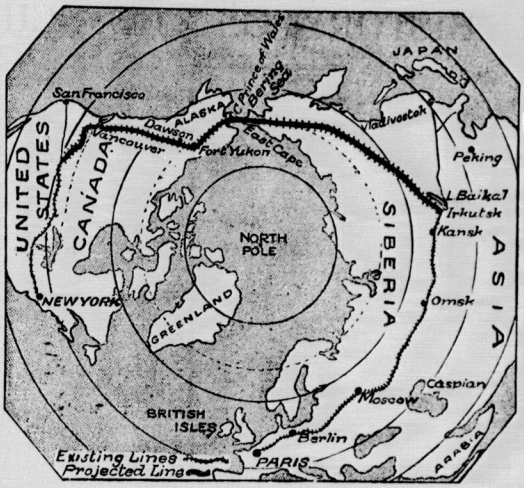
Then again, take the *train de luxe* to the Mediterranean, which, during the winter months leaves Calais at 2.45 p.m., corresponding with the 11 a.m. express from London. Even with the splendid steamers now engaged in the cross-Channel service, a large number of people fear the sea passage so much that they abandon all hope of going to the warm climate of southern Europe. But if the Channel Tunnel were once made, such persons would get into the same *train de luxe* at Charing Cross at mid-day, lunch while travelling, and, without change of carriage, arrive in Nice the next day in time for breakfast. The French Custom officers would accompany the train, and hand, as well as registered, baggage, would be examined *en route*. All personal inconvenience would thus be avoided. No longer would it be necessary to leave a train at one station, and to drive across Paris to another terminus. The services of cabmen and porters would be dispensed with, except at the destinations; and, as Mr. H. M. Snow, the Agent-General of the International Sleeping Car Company, truly says, "the journey to Monte Carlo would, in these circumstances, be just as comfortable and no more difficult than that from London to Brighton." And in such matters there is no higher living authority than that gentleman, inasmuch as he has assisted in the organization of almost every *train de luxe* crossing Europe and going beyond Europe—to the Far East. He is, therefore, well qualified to offer an opinion as to the inestimable benefit which the Channel Tunnel would confer upon International Travel.

Precisely the same expectations may be held out respecting the trans-Continental trains. The Channel Tunnel would be particularly welcomed by passengers to the Far East over the Trans-Siberian Railway. With the doubling of the line of that wonderful undertaking—a work which will, it is expected, be completed a little more than a year hence—travellers would be able to step into the Trans-Siberian train at Charing Cross, and reach China in eight days, or Japan in nine days. The journey now occupies twelve and thirteen days respectively; but before the opening of the Trans-Siberian Railway, it extended over from five to seven weeks!

Mr. Snow is convinced that within two years after the opening of the Channel Tunnel, there would be a triplication in the number of persons crossing the English Channel, and he says that, however much the outward traffic to the great cities of the Continent and the Far East increased, the stream of passengers to London might then be expected to expand in the proportion of 100 to 1. A terminus for the International traffic would, he declares, be absolutely necessary, on the south side of the Thames, immediately opposite the existing Charing Cross station, direct access to the new structure being given by a monumental bridge and a wide thoroughfare running from Trafalgar Square. In recent years London has come to be recognized as a cosmopolitan city not only of business, but of pleasure; but Mr. Snow says that "with the Channel Tunnel open, London will be the Mecca of the world."

LONDON TO NEW YORK BY RAIL.

By the courtesy of the proprietors of the *Daily Graphic*, the Editor is able to reproduce a map which illustrates the kindred project of linking Europe, Asia and America by means of the proposed Trans-Alaska-Siberian Railway.



TO LINK UP EUROPE, ASIA AND AMERICA: THE ROUTE OF THE PROJECTED TRANS-ALASKA-SIBERIAN RAILWAY.

The accompanying map was published in the *Daily Graphic* on the 17th March, 1906, together with the following particulars relating to the scheme:—

Reuter's St. Petersburg correspondent telegraphs:—An examination was begun yesterday of a proposal put forward by an American syndicate for railway communication between Kansk (Siberia) and Alaska. The proposal includes the making of a tunnel underneath the Bering Straits. The syndicate will, if its proposal is accepted, build the line at its own cost, in return for a twenty-four kilometre strip of land along the entire line, to be used for purposes of industrial development.

The project for linking up by railway the metropolis of the Old World with the chief town of the New has again been revived, after lying dormant for some time, its originator, Monsieur Loicq de Lobel, having first suggested it some sixteen years ago. In 1902 a pamphlet advocating the scheme was published in Paris, in the English language, with the title, "The Trans-Alaska-Siberian Railway," and from that report the accompanying map is taken. Briefly, the project comprises two lines—one connecting the Trans-Siberian Railway, and the other the Trans-Continental line from San Francisco to New York, with Bering Straits, and under this arm of the sea, on the line of the Arctic Circle, an immense tunnel, 38 miles, is to be constructed. The Siberian section of the line would branch off from the Trans-Siberian at Irkutsk, and skirting Lake Baikal, would run in nearly a straight line to East Cape, the most easterly point in Asia. The American section would traverse Canadian territory from Vancouver to Dawson City, and then run due west to Cape Prince of Wales, the most westerly limit of the American Continent. The tunnel would connect East Cape with Cape Prince of Wales, and would be driven through solid rock, the work being facilitated by sinking shafts from the two islands on the line of the tunnel, so that the excavation could proceed simultaneously from six different points. The total cost of the line is estimated at £54,000,000, and it is stated that an American syndicate is ready to finance the project, but there are immense natural difficulties in the way, and for a long time to come all good Americans who want to see Paris before they die will doubtless prefer using the existing routes to the risk of waiting for the realisation of this gigantic enterprise.

If sanction be given to the two great undertakings of a Tunnel under the English Channel, and a Railway from Siberia to the American Continent, uninterrupted railway traffic for passengers and goods will be rendered possible from any part of Great Britain to Europe, Asia, Canada, and the United States of America.

An "intelligent anticipation of events to come" is seen in the Illustrated Programme of the Inauguration of the Forth Bridge, on 4th March, 1890, showing—at the back of the Prince of Wales, the late King Edward VII., surrounded by Railway Directors and Managers—a Sleeping Car Saloon drawn by an engine called "Progress," bearing the inscription:—

"Through Carriage Aberdeen, London, Dover Channel Tunnel, for Paris, Berlin, St. Petersburg, Alaska, Canada."

BRIEF HISTORY OF THE SCHEME.

The following is a brief history of the project for constructing a Submarine Railway between England and France :—

1874. A concession was obtained from the French Government by several gentlemen, including M. Michel Chevalier, M. Lavalley, M. Raoul Duval and others, composing the French Tunnel Company. A shaft at Sangatte, near Calais, was sunk to the level of the proposed Tunnel. Boring machines driven by compressed air were employed, and a gallery was driven forward for a mile and a half beneath the sea.

1875. The Channel Tunnel Company obtained an Act of Parliament permitting them to undertake experimental operations at St. Margaret's Bay, east of Dover. No practical work was done, and the company was bought up by the Submarine Continental Railway Company, in 1886.

1881. The South Eastern Railway Company obtained an Act giving them powers for experimental borings and other works in connection with a submarine tunnel. Under this Act, a shaft (No. 2) was sunk near to the west end of Shakespeare's Cliff, 160 feet deep, and then a Tunnel was formed, 7 feet in diameter, for 2,015 yards.

In addition, two other shafts were sunk—No. 1 at Abbot's Cliff, with 880 yards of submarine gallery, and No. 3 on the Dover side of the Shakespeare Cliff, the latter being intended for the purposes of ventilation and drainage when connected with the Tunnel from No. 2 shaft.

These works and tunnel were taken over by the Submarine Continental Railway Company, who repaid the South Eastern Railway Company their outlay in cash and shares.

The Submarine Continental Railway Company was formed with a capital of £250,000 in £1 shares, and 246,883 shares were issued. Registered 12th December, 1881.

1882. The Submarine Company took over the experimental works and Tunnel carried out by the South Eastern Railway Company as previously mentioned, but the shafts, etc., were kept open and ventilated for some considerable time afterwards, proof being afforded that very little water had entered the Tunnel.

Owing, however, to the action of the Board of Trade, the boring ceased in July, 1882, when 2,026 yards of the Tunnel had been made.

1883. Joint Select Committee of the House of Lords and the House of Commons appointed; heard considerable evidence of the promoters—military evidence and others on the proposal of a Tunnel under the Channel. Report published, consisting of 574 pages of evidence.

Baron Emile d'Erlanger elected a Director of the Channel Tunnel Company, in the place of Sir Phillip Rose, deceased.

1886. Capital of Submarine Company increased to £275,000 to enable the Company to purchase and absorb the Channel Tunnel Company. A meeting of the latter Company was held 10th December, 1886, for the purpose of winding-up that Company.

1887. The Submarine Railway Company having purchased the Channel Tunnel Company, the Board of Trade sanctioned the change of name to the latter title by which, viz., "The Channel Tunnel Company, Limited," it has since been known. Certificate of Incorporation granted 14th March, 1887.

1897. The Capital of the Channel Tunnel Company was reduced by Special Resolution of the Company and confirmed, which was approved by the High Court of Justice 31st July, 1897. Present capital, £91,351 8s.

1901. Baron Emile d'Erlanger elected Chairman of the Channel Tunnel Company, in succession to Sir Edward Watkin, who was the first Chairman.

1905. Baron Emile Beaumont d'Erlanger elected a Director of the Channel Tunnel Company.

1906. Resolution in favour of scheme withdrawn in House of Commons owing to opposition of the Government.

1911. Baron Emile Beaumont d'Erlanger elected Chairman of the Channel Tunnel Company, in succession to his father, Baron Emile d'Erlanger, deceased.

1913. Scheme revived by His Majesty's Government calling for reports thereon by the Admiralty, the War Office, and the Board of Trade. These reports to be submitted to the Committee of Imperial Defence, for subsequent decision by the Cabinet.