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A CENTURY OF RAILWAY PROGRESS.

By H. O. ERNST.

The necessity for a well-developed Railway System in Switzerland was recognised at an early date. Various projects were under discussion as early as 1830. The reasons for our comparative lateness in adopting the "Iron Horse" as a means of transport were mainly political.

Until 1848, Switzerland was a Federation of small independent States or Cantons. To co-ordinate the many local interests and to create a common basis for any useful project, was almost impossible. To illustrate this, I may only mention that about 1830, there were in Switzerland 400 interior Customs and Toll Barriers.

Our first Railway Line, from Zurich to Baden, came into operation on 9th August, 1847, twenty-two years after Stockton-Darlington, at a time when England already has 3,928 kms., and the U.S.A. 7,454 kms. of track under steam. Other reasons for the comparatively late and slow development of our Railway System, were the mountainous nature of the country, and the provision of the necessary capital or building funds. Switzerland was, at that time, by no means a rich country, and State Aid was out of the question, as there was then no Central Government.

The new Constitution of 1848 transformed Switzerland politically from a loose Federation of Cantons or small States, into a Confederation with a Central Government in Berne. Then as now, much of the Legislation and Executive Power was wisely left to the Cantons. Those matters, however, which were in the interest of all, or, if you like "Federal", were delegated to the Central Government. As one result, the passage of persons and goods throughout the Confederation, became free and unhampered. Furthermore, from the very outset, the new state took a deep interest in Rail Transport. The Federal Act of 1852 decided that "the Construction and Operation of Railways is left to private enterprise, governed by Cantonal Legislation." Although, as we see, the State did not at that time directly interfere with the Cantons in Railway matters, it nevertheless kept a watchful and benevolent eye on the future. For the purpose of safeguarding the Military Defence of the Country, no Cantonal concession was valid without the approval of the Central Government. Moreover, the State already then reserved to itself the right of purchase, in other words, Nationalisation. How much interest the Confederation, as a whole, took in the future Rail Traffic developments is shown by the two following examples:—

In 1850, the Swiss Legation in London received instructions from the Government to invite Mr. Robert Stephenson, M.P., the son of Stephenson of the "Rocket", and Mr. H. Swinburne, an engineer, to work out plans for a Swiss Railway System following the main valleys. The same year, the Swiss Parliament helped the Cantons considerably by passing the Federal Act of Compulsory Expropriation of Private Property. How important this was, will be evident when we recall the manifold objections to Railway Building by all sorts of people: from farmers who feared for their cattle, from all sorts of cranks and, more serious, from vested interests who saw their livelihood threatened by the new-fangled contraption.

We are now entering a period of active development and construction. By 1872, there were five large Private Railway Undertakings, connecting all the important centres from West to East, and in 1883, with the Opening of the Gotthard Railway, from North to South. All of these concerns had their ups and downs. More than one had to seek financial aid from the Cantons in times of crisis. Much of the invested capital was foreign, and in some cases, unscrupulous share speculations, especially at the Paris Stock Exchange, helped to create an atmosphere of uncertainty, not to say panic. The Gotthard Line, that unique and imposing traffic link, from North to South, was the result of a tri-lateral Agreement between Switzerland, Germany and Italy. Although built privately, the three contracting States, in view of the International character of the line, and its commercial importance, provided the following subsidies:—

Switzerland:	20 million francs,
Italy:	45 million francs,
and Germany:	20 millions.

It is interesting to note that the Swiss quota of 20 millions was paid by the Cantons, and not by the Central Government, who made the Treaty with our two neighbours. We are, therefore, in 1870 still under the Regime of direct Cantonal Railway Legislation and Private Enterprise. The new Federal Railway Act of 23rd December, 1872, however, whilst permitting the private building of Railways, takes the granting of concessions away from the Cantons, and therefore makes it a Federal Prerogative. From then until the present day, Company Statutes and Building Plans have to be submitted for approval, and all constructional work is supervised by Federal engineers, who

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also control all equipment and check safety measures and appliances. Time Tables and Tariffs are not valid without the approval of the Federal Traffic Office.

The tendency was unmistakable: we were approaching a period of centralisation, which within a space of ten years eventually led to Nationalisation of the main Lines. The battle for and against State Ownership of the Railways raged for several years. A first attempt was made in 1891 to purchase the Central Swiss Railway for the Nation, but the opposition won the day. The Swiss Electorate would have none of it, and voted against the Government. Seven years later, on 20th February 1898, the nationalisation of our main lines was again put to the popular vote and accepted by a majority of 200,000. The problem, State or Private Ownership, which had occupied the minds of politicians on and off for half a century, was solved. The relevant passage of the "Rückkaufgesetz" or Redemption Law reads as follows:

"The Swiss Confederation is rightfully empowered and commissioned to purchase any railway which, in their opinion, serves from a Military Defence or economic point of view the interests of the Confederation or a major part of it, and to operate it under the name of Swiss Federal Railways."

On 1st January, 1902, a Central Swiss Railway, the Swiss North-Eastern, and the Wohlen-Bremgarten Line went over to the State. On 1st July of the same year, the United Swiss Railways, the Toggenburg Railway and the Wald-Rütibahn; on 4th May, 1903, the Jura-Simplon Railway, and on 1st May, 1909, the Gotthard Railway, altogether 2,730 kms. of track were bought back. The purchase price was Sw.Frs. 1,160,499,000.— At present, there are still about 80 privately-owned standard and narrow gauge Railways in Switzerland, not counting Funiculars, etc.

The Shareholders of the Private Companies had no reason to complain. The Confederation liberally paid them 114 million francs more than the original capital invested. It is generally admitted that the Swiss Government was, in this instance, a trifle too generous and thereby, placed a heavy financial burden on the new Swiss Federal Railways.

The reasons for nationalisation of the Swiss Railways were not quite the same as in the case of Great Britain. The main consideration, which led the Swiss Government to take over the reins from the private Companies, is evident from the passage of the Redemption Law quoted earlier. There are others. As already mentioned, the invested capital was, to a great extent, foreign. With the new Constitution of 1848, and the political unification of the Country, the Swiss people began to look with disfavour upon foreigners partly owning and running their railways, and created the slogan: "The Swiss Railways for the Swiss People". This is understandable. Not only the profit, if any, went into the pockets of foreign investors, but nothing, or very little, was done in the way of improvement to rolling stock and other equipment. The interests of the Shareholders came first. As a result, the new State Railways had to face from the very outset the huge task of co-ordinating the activities of the various units taken over, of technical repairs and improvements, and, last but not least, the necessity of creating for the staff, also taken over from private enterprise, some

uniform and adequate remuneration and a measure of social security.

A State Railway has, furthermore, tasks and obligations which differ greatly from the more commercial and profit-making activities of a private transport undertaking. The people, who by their own will were the owners, rightly expected *their railway* to repay them by providing a Public Service par excellence. Mere considerations of profits no longer entered into the picture. The transportation of persons and goods had to be arranged on the principle of the best effort for the common good. This was not easy and quite certainly does not always pay. I shall later go more fully into the questions of Profit and Loss under Nationalisation.

I shall now outline in as few words as possible, how the Swiss Federal Railways are administrated. The sovereign Authority is the people, represented by the Federal Assembly, in other words, the Joint-Meeting of both Houses of Parliament. It delegates the executive power to the Federal Council or Cabinet. The Ministry of Transport supported by an Administrative Council of fifteen members and three General Directors, govern our State Railways. The three General Directors share the direct responsibility for the Executive Management of Swiss Federal Railways on the collegiate principle. One of them, the President, is in charge of Finance and Staff. The second runs the Legal and Commercial Department, and the last one's concern is the Department for Construction and Operation. You may want an explanation of the collegiate system, which is so dear to the Swiss heart, and also applies to the Federal Council. It simply means that important matters, although they may only concern one Department, are discussed by the three together, or rather, the three are responsible for any measure taken by one. The advantages of this method are obvious.

The Swiss Federal Railways are divided into three Administrative Areas or Divisions. Their seats are Lausanne, Lucerne and Zurich respectively. Each Divisional General Manager administrates his area through three departments:— Administration, Construction and Operation.

Let us examine the question whether a State Railway pays, or rather whether in our own case, the Swiss Federal Railways show a Profit. This is a subject which has been discussed, debated and written about in every country. To begin with, the Swiss Federal Railways, although, as we know, a State Concern, has from a financial point of view to fend for itself. In other words, it has to present a yearly Balance Sheet and Budget to the Government. Losses are not *ipso-facto* made good by the State, as for instance, in the case of the Italian State Railways. This does not mean that the Swiss Government stands aloof, or is not prepared to grant financial aid, if required. The economic crisis from 1932 to 1936, and many other factors, for instance the enormous cost of electrification at a time of high prices and wages, made State Subsidies necessary. In 1944, the Confederation took over 900 million francs of the accumulated debt of the Swiss Federal Railways, and thus lightened the intolerable financial burden, which our State Railways had in ever increasing measure been carrying for 42 years. At any time, and especially during the war years, the Swiss Federal Railways had to face unpaid tasks in the service of the Country. The most onerous

single factor, however, which led to the gradual deterioration of the financial position was undoubtedly the heavy over-capitalisation of our Railways. I have mentioned elsewhere that the purchase price paid to the private Companies was excessive. Since then, technical progress has been rapid and costly. All this and the adaptation of Tariffs, both for passengers and goods, to the needs of the people, rather than to a profit motive, higher wages, staff pensions, etc., have led to increased expenses and to heavy borrowings. As there is no Share Capital, all loans taken up are, of course, "gilt-edge" at a fixed rate of interest. These interest charges on borrowed capital alone are to-day still well over one million francs a week. This weighs heavily on the debit side of our Balance Sheet. Most years, the Swiss Federal Railways make a working profit. This is, however, more than absorbed by interest payable on borrowed capital and other fixed charges. Perhaps I can best illustrate this by giving you an example. In February, 1949, Traffic Receipts were 44,158,946 francs, Running Expenses 39,835,288 francs. The difference on the Credit Side is Frs. 4,323,718. In August of the same year, the respective figures were Frs. 61,215,000, 41,932,000 and Frs. 19,283,000. As the Debit in the Profit and Loss Account for interest payments, and fixed charges such as contributions to the Pension Funds, Depreciations, etc., amount to 14.1 mill. francs a month, February shows a loss and August a small surplus. It is, therefore, true to say that our nationalised Railways do not often show a monetary profit, and are unlikely ever to pay their own way entirely, especially since the loss of the transport monopoly through the advent of the

motor car. I would not like to use this fact as an argument against Nationalisation, nor would the Swiss ever think of handing their main Lines back to private Enterprise. In our Railways, we believe we have an instrument of public service, which is essential to the economic life of the Nation. Its benefits to the people, as a whole and individually, cannot be shown in a Balance Sheet.

The success of any undertaking, and especially public one, depends to a great extent on the staff. I would therefore like to say a few words on our Personnel.

The Swiss Federal Railways to-day have about 33,000 permanent employees, who have Civil Service Status. They must be of Swiss nationality, and for all operational branches, physically fit for military service in the Swiss Army. Qualifications and training differ according to the various service branches. It would take too long to refer to all of them, but it would perhaps be interesting to follow the career of a young man, who wishes to enter the Railway Service as a Station Clerk. He must be physically fit, between 16 and 25 years of age, and have a good secondary school education. Great importance is attached to a thorough knowledge of his own language and of at least, one of the other three Swiss national tongues. His Entry Examination comprises the following additional subjects:— Mathematics, Geography, Swiss History and Citizenship. After an apprenticeship, which varies in duration according to his progress and the general staff situation, he is appointed by contract on a permanent basis. In many cases, the young man prepares himself for a

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Grenzgletscher Monte Rosa, above Zermatt.

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Railway career by entering, after his Secondary School training, one of the three Swiss Railway Colleges, which form part of the Technical Academies in several Swiss towns. The curriculum lasts two years and gives him a good theoretical and, to some extent, practical training. The writer learnt to drive a steam engine as a student in one of these Colleges, and worked in a signal box under the watchful and benevolent eye of an old Stationmaster. I have never since had occasion to practice, or to extend this technical knowledge in the operational field, but still think that this overall training did me good. If nothing else, it helped me later, as Stationmaster Assistant, better to understand and to appreciate the work of my colleagues.

Promotion is in accordance with individual ability and the needs of the service. It does, therefore, by no means depend on whether one has been to a Railway College or not.

From a social point of view, the Swiss Railwayman is well-looked after. He and his family are protected by a Pension Fund and against illness or accident by State Insurance. He is free to join any Trade Union, provided it is not unconstitutional, or to accept public office, provided this does not interfere with his duties. He is, however, debarred from following another trade or profession. In other words, he must devote his time and efforts solely to his duties as a Railwayman and Civil Servant. The Swiss Railwaymen's Union is a powerful body. It has slightly over 50,000 Members, of which over 30,000 belong to the Swiss Federal Railways, and the remainder to private Railway Companies. Nearly everybody, from the lowest to the highest grade, belongs to it. I do. The Union has often been called "A State within the State", by opponents. The happy fact remains that the Swiss Railwaymen's Union, which naturally inclines to the Left, is, as a whole, very conciliatory and fair. Its Executive Council is in permanent consultation with the Management of the Swiss Federal Railways on all Staff and allied questions. Both sides do their best to iron out difficulties, and to meet each other either half-way, or on an acceptable basis. Civic spirit, in other words, the Public Duty, not to do anything which could injure the Country or its people, is ever present in the minds of both parties. Collective bargaining has been, and is a success in Switzerland, and Railway strikes are practically unknown. Disaffection or disloyal independent action by Trade Unionists against their own Organisation is most unlikely. I cannot recollect a single case.

If we compare salaries paid by the Swiss Federal Railways to their Staff with those of other countries, we find that the Swiss scale is more equalised. Higher Posts draw lower salaries than, for instance, in England, and the rank and file are better paid. Let me give you a few examples of top salaries, converted into sterling at the present rate of exchange of 12 Swiss francs to the £:— Mechanical or electrical Engineer 1st class £1,226, Technician 1st class £997, Administrative Clerk £661, Foreman (Constructions) £633, Goods Depot Worker £488, Stationmaster 1st class £1,179, Station Clerk 1st class £738, Chief Train Guard £767, Travelling Ticket Collector £661, Engine Driver 1st class £882

Since the memorable day in August, 1847, just over 100 years ago, when the first Swiss train connected

the growing industrial and commercial centre of Zurich with the spa-town of Baden, enormous progress has been made. The two World Wars, which left Switzerland physically untouched, have slowed it down, but not to a great extent. In 1947, for the Centenary Celebrations, the Swiss Federal Railways built an exact replica of the first train. It travelled all over our System at 25 km. an hour, and showed the people, probably better than anything else, the great revolution which a mere century has brought to Rail Transportation.

Probably the greatest single technical effort and achievement of the Swiss Federal Railways has been the electrification of 2,697 km. of track. This represents 93.11% of the total mileage, or rather, kilometerage. The idea to use our enormous reserves of Water Power for this purpose goes back to the early years of the 20th century. In 1913, the Swiss Federal Railways provided a credit of 38.5 million francs for the initial electrification programme, and plans were made for the two Power Stations at Amsteg and Riton on the Gotthard Line. 1914 and the outbreak of the first world war slowed down these first efforts. In 1916, when the price of imported steam coal had risen to six times the pre-war price, and unemployment increased in Switzerland, it was decided to carry on at an increased pace. The long debated question as to which was the more suitable current system was decided in favour of mono- or single phase alternating current for our main Lines. The turbines of the large hydro-electric station supply 15-20,000 horse power, which produce alternating current, stepped up

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Organisé par la Confrérie Vaudoise dans le but de commémorer sa Fête de l'Indépendance, voici les faits, prenez-en note: Nous serons honorés à cette occasion de la présence de Monsieur le Ministre et Madame de Torrenté. Réception dès 6h 30. Dîner à 7h. précises. Carte de Fête: sh. 25 (boisson comprise aux tables spéciales des jeunes). Tenue de soirée, à part les jeunes qui pourront venir en habit foncé. Une Tombola sera offerte: même votre Carte de Fête vous sera gracieusement donnée si Dame Fortune vous sourit. Musique, danses, rires et attractions apporteront une gaieté bien romande à cette festivité de l'année.

Pour renseignements et billets, écrivez dès aujourd'hui à MM. A. Renou, Président, 14, St. George Street, W.I (May. 5977). E. A. Grau, Trésorier, Stone House, Bishopsgate, E.C.2 (Bis. 5911).

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through the transformers to 132,000 volt, carried by overland lines to the 26 sub-transformer stations. They reduce the current down to 15,000 volt for the overhead copper track wire with a diameter of 10.7 m/m. Third-rail working is not practicable in Switzerland owing to heavy snow-falls. At present prices, electrification saves the Swiss Federal Railways over a million metric tons of coal, or about 37 million francs per year. More important still, as we have no coal of our own, it makes us independent of foreign supplies. The various types of electric locomotives are built exclusively in Switzerland at Baden, Oerlikon and Geneva. Their construction and tractional capacity varies with the purpose for which they are designed. Taking the two extremes for the purpose of showing the progress made in the short space of ten years, I would only mention the following two units:—

SERIES : BE 4/6 :

built in 1920 for the Gotthard line ;
overall length, 16.5 m. ;
service weight, 111 metric tons ;
number of motors, 4 ;
diameter of driving wheels, 1.53 m. ;
power output, 2,040 h.p. per hour ;
max. speed, 75 km. per hour.

Tractional Capacity :

Fast Passenger train :

Grade 10%o 480 metric tons at 65 km/hour ;
Grade 26%o 230 metric tons at 60 km/hour.

Goods train :

Grade 10%o 815 metric tons at 35 km/hour ;
Grade 26%o 310 metric tons at 35 km/hour.

SERIES : AE 8/14 :

built in 1939 for general purpose ;
overall length, 34 m. ;
service weight, 246 metric tons ;
number of motors, 8 ;
diameter of driving wheels, 1.61 m. ;
power output, 11,400 h.p. per hour ;
maximum speed, 100-110 km. per hour.

Tractional Capacity :

Fast Passenger Train :

Grade 0%o 1,600 metric tons at 95 km/hour ;
Grade 10%o 1,500 metric tons at 65 km/hour ;
Grade 26%o 730 metric tons at 60 km/hour.

Goods Train :

Grade 0%o 4,000 metric tons at 60 km/hour ;
Grade 10%o 1,900 metric tons at 35 km/hour ;
Grade 26%o 385 metric tons at 35 km/hour.

With regard to the capacity of the Ae 8/14, I must mention that for practical purposes in view of the tractional strain, the maximum capacity is limited to 2,000 metric tons.

I should perhaps also mention the electric locomotive of the series Re 4/4, which is used to haul the fast light-steel Passenger Expresses. These provide a rapid connection between the large towns, and are actually called : "Inter-City Trains". They are greatly appreciated by business people and tourists alike.

The specification of this engine is as follows :—
built in 1945 ;

overall length, 14.7 m. ;
service weight, 56 m.t. ;
number of motors, 4 ;
diameter of driving wheels, 1.04 m. ;
power output, 2,300 h.p. per hour ;
maximum speed, 125 km. per hour.
Tractional capacity up to 12%o gradient, 480 m.t. or

15 light-steel alloy passenger coaches fully loaded. If our stock of locomotives is of necessity modern, our passenger coaches are in part still of the old three-axle type. They are mainly used for local traffic. For fast and through traffic two-bogies four-axle stock of light-steel construction is used. It has proved its value both from a commercial and comfort point of view, and is still being build to replace older material. About 20,000 goods trucks of various design and capacity serve internal industry and commerce as well as Export and Transit Traffic.

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The Technical progress since nationalisation and the increase in traffic density have revolutionised the planning of track and stations, as well as the signal equipment. Between Wilerfeld, a suburb of Berne, and the Capital, there is, for instance, a movement of 236 trains per day. This output would have been quite impossible a comparatively short time ago. With greater speed and greater demand on transport capacity, most stations and main lines had to be re-designed or re-built. As a result, Switzerland, with its population of about 4½ millions, has to-day a very efficient Railway System. To illustrate this, I will mention a few figures:—

In 1941, the total train traffic kms. for the whole country, including the privately owned railways, was 51½ mill. passenger trains km. and 17 mill. goods train km. Before the last war, the Swiss Federal Railways alone carried about 300,000 passengers a day; in 1943, this figure rose to 500,000. Modern equipment and specially an up-to-date signalling system have reduced accidents to negligible proportions. In 1942, out of 160 mill. passengers carried, 24 were killed, and, of this number, 14 lost their lives through their own negligence.

You would probably like me to say a few words on our Passenger Tariffs, a chapter, which in order to do it full justice, would require a separate article. However, I shall restrict myself to the essentials. The basic rate per km. is:—

	I. Cl.	II. Cl.	III. Cl.
for single journeys from 1-150 km. ...	3.9d.	2.7d.	1.9d.
for single journeys from 151-200 km. ...	2.3d.	1.6d.	1.1d.
for single journeys of 200 km. and over	1.5d.	1.09d.	0.78d.
for return journeys from 1-150 km. ...	5.8d.	4.1d.	2.9d.
for return journeys from 151-200 km. ...	3.5d.	2.4d.	1.7d.
for return journeys of 200 km. and over	2.3d.	1.6d.	1.1d.

Local return tickets are available for ten days. You will notice that the fares are based on a Differential Tariff, in other words, the basic rate decreases with the distance travelled. Children between 6-16 years pay half-fare. There is also a considerable reduction for families (father or mother and, at least, two children, or father and mother and, at least, one child). One parent pays the full fare, the other parent, also children over 16 and two children together from 6 to 16 years pay half-fare.

For week-ends specially reduced tickets are available at single fare for return. They can be used outward on Saturday or Sunday; the return on Sunday or Monday, but not later. A Party Tariff is available

for group travel and schools. The reduction for adult parties compared to ordinary fares depends on the number of participants and is as follows:—

6-14 persons, 20-30%; 15-99 persons, 30-40%; 100-249 persons, 35-45%; 250 and more, 40-50%.

For school children and students up to 16 years, travelling in groups of, at least 6, the rebate is 65-75%; for those over 16 years, 45-55%. Scholars and apprentices, for their daily journey to school or place of work, are entitled to greatly reduced special season tickets, and pay only 10-15% of the ordinary fare. Special monthly workmen's season tickets, available weekdays only, carry a reduction of 80%. Similar to British workmen's tickets, they can only be used on certain trains in the morning and evening.

For the businessman, there are various types of General Season Tickets, allowing unlimited travel. A special feature is the Holiday General Season Ticket, valid 15 or 30 days. It is a sort of "magic carpet" and very popular, especially with tourists. On any 6 of 15 days, or any 12 of the 30 days, the holder can travel freely over the Swiss Federal Railways and the lines of about 70 private Railway and Steamboat Companies. During the remaining 9 or 18 days, the passenger is entitled to purchase tickets at half rate, also on the postal motor services.

Since the war, the Swiss Transport Undertakings have introduced the "Holiday Ticket", which has become a great favourite both in Switzerland and with holiday guests from abroad. It consists of a cover for which the following basic charge is made:—

Fr.25.—=£2.1.8d. for 1st class, Fr.20.—=£1.13.4d. for 2nd class, Fr.15.—=£1.5.0d. for 3rd class.

The actual tickets are inside the cover, and can be had at the choice of the passenger for return journeys or circular tours. The rate applicable is approximately half the ordinary fare. This ticket is valid one month only, but can, against payment of a small supplement, be extended to two months. This Holiday Ticket, as a novel feature, entitles the holder to five excursions at about half fare. For this purpose, the back cover of the ticket contains five control squares, which are cancelled by the station where the Excursion Ticket is purchased.

These are only a few examples of our Tariff System, which is well-articulated and admittedly rather complicated. The same applies to goods tariffs. It must, however, not be forgotten that it has to cover a variety of purpose: local interests, with special regard to internal economic and social conditions, tourist traffic from abroad and transit traffic. How many problems, for instance, the present monetary situation in Europe presents to our commercial management can well be imagined. Our fares and rates, expressed in foreign currencies, go up with every devaluation abroad. It is to-day in many cases true to say that, in the field of transportation as in others, we can only compete against our soft currency neighbours by providing better and faster service.

These are some of the aspects of rail transportation in Switzerland. I have tried to show the development and progress of our railways, and especially of our State Undertaking, the Swiss Federal Railways.

Nobody realises better than I do, that the subject is by no means exhausted, but I hope to have given a fairly comprehensive picture.

