

# TELEGRAPH SYSTEMS OF THE WORLD:

THE STORY OF THE NERVES OF OUR COMMERCIAL LIFE.



THE time required to send a telegram or cablegram and receive an answer is frequently a disappointment, if not an irritation, to people who have never considered the telegraph

as anything but a streak of electricity. To send a message from London to New York, for instance, and get an answer in two hours, is quick work. Mr. W. H. Preece, the courteous chief engineer of the English postal service, mentions, as an example of very quick work, sending a telegram from London to the Cape and receiving an answer in twenty-four hours.

In the English Post Office a delay of two days in delivering a European message, and one of six for an extra-European, is not thought astonishing, and the cost will not be refunded if the delay is less.

He who is surprised at this forgets the manipulation which the message goes through. Thus, in the case of a cablegram from London to New York and back, there is a change at Penzance from the London wire to the Atlantic cable, and another at Canso, Nova Scotia, from the Atlantic cable to the New York wire. In New York there is the delivery, the answer and the forwarding, and then a repetition of the changes.

If there were no overcrowding of wires, no delays from inattention, no changes, no messages having "right of way," the result would be quite satisfactory to the popular demand for "lightning speed." An incident famous in the telegraphic world shows what can be done in the way of transmission when the wires are free and the operators waiting.

Some years ago, at a telegraphic *soirée* in the Albert Hall, a feature of the evening's amusement was the sending of a message to Teheran, in Persia, and back. A sending and a receiving instrument had been put up in the hall and connected with the wires of the Indo-European Telegraph Company. This line crossed the Channel by cable to

Germany, and then by land lines ran over Germany, South Russia, Caucasus, Armenia and Persia, to Teheran. At Teheran the wire was joined to a second line of the company, returning to London by the same route.

The lines were cleared for the experiment, and, at a given signal, the key of the sender was pressed by the Prince of Wales. The instant that the button of the instrument was touched, click went the receiver. The current had been to Persia and back!

It is only in the case of especially important news that everything is arranged in advance to secure practically instantaneous results. In the case of a race like the Derby, or of a match like that between Oxford and Cambridge, America in something

the news reaches like fifteen seconds.

This is done easily enough. Beforehand a certain syllable is fixed for each element in the contest. Thus, in the case of the boat-race, *Ox* stands for Oxford, and *Cam* for Cambridge. As soon as the decision is made, an operator waiting near the racing-ground telegraphs to the cable station at Penzance.

The operator at the receiver of the land wire is free to watch for the news. As he receives the first letter, *O*, he shouts it out to a man waiting with his finger on the key



From a photo by

[Humphreys, Carnarvon.]

MR. W. H. PREECE.

(Chief engineer of the British Postal and Telegraph System.)

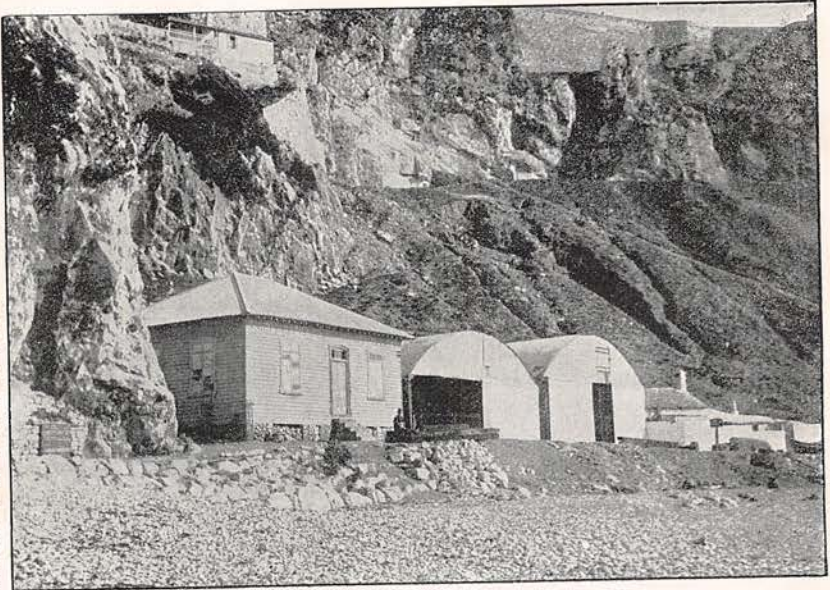
of the cable instrument, which is in the same room, and he flashes the letter to New York. Before *X* can be called out—and that seems to be done instantaneously to one who listens—and the key of the cable instrument can be pressed a second time, the first letter is in New York. In fact the crew does not have time to pull up, any more than does the winning horse at the Derby, before New York sporting men have the news.

The delays in the case of the ordinary message are all from manipulation and over-crowding. There are none from examination of contents, from estimating duties at frontiers, from verifying the right to traverse the different countries; that is, the common hindrances to international transit do not exist in the case of telegrams.

Telegraphy was, indeed, the first interest to conquer these difficulties and to bring the Governments of the world together in a union. This International Telegraphic Convention, as it is called, was founded in Paris in 1865. At that date telegraphy had no such extent as it has now. The possibility of an Atlantic cable, sure and efficient, was still in debate. None of the great overland routes had been as yet completed. The telegraphs of each country were isolated, doing very well for internal traffic, but very badly for external. A message which in those days was sent across several boundaries was subject to an infinite number of annoyances and delays, and its cost was exorbitant.

The inconvenience and folly of this was so evident that in 1865 France called a convention of European states, with the object of putting an end to the irregularities. Twenty states replied; and at that gathering they succeeded in forming a convention which, with some changes, still remains in effect.

In 1865 there were but twenty nations represented. In 1890, at the last congress, there were over a hundred delegates present. At present thirty-eight different nations and thirteen private companies are subscribers to the constitution. Thirteen other private

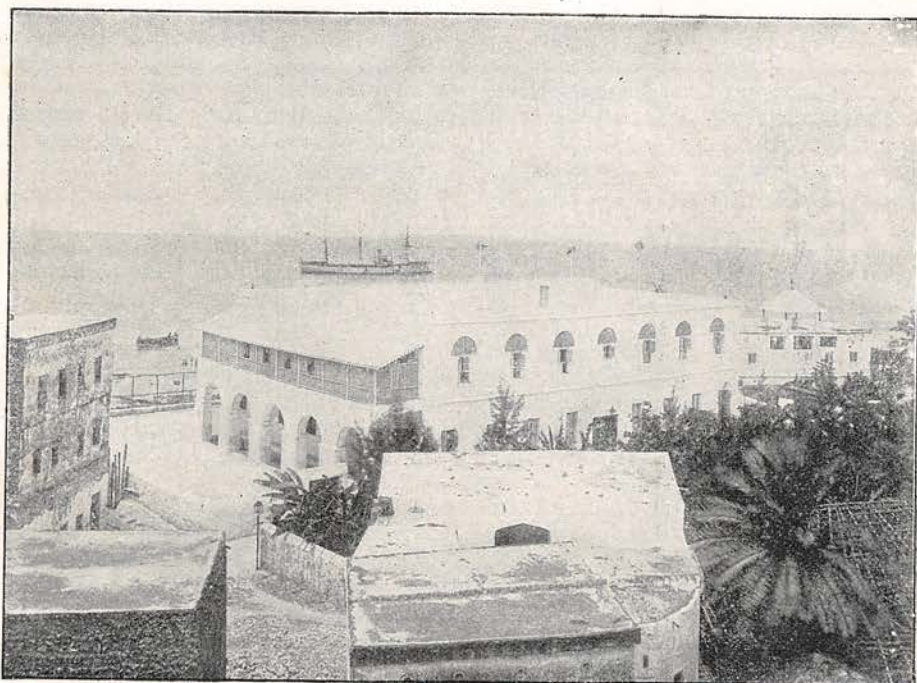


CABLE STATION AT GIBRALTAR.

companies follow the rules of the union, although not regular members, and several others are indirectly united to it.

This Convention, to which Governments and private companies have assented, requires that each party shall devote a certain number of direct lines to international telegraphy, and that everybody shall have the right to use them. It guarantees the privacy of correspondence, permits that it be sent in secret language if the sender desires, and arranges that messages shall be transmitted in the order of their importance. It aims at securing unity of rates each way between every two points, dictates a monetary standard for international tariffs, and makes all regulations which will insure quick transmission and delivery.

At the successive conferences, held every five years, all changes in and additions to the original convention found necessary are made. In order to have a headquarters to which and from which all matters concerning the Telegraphic Union could be sent, the congress established the *Bureau International des Administrations Télégraphiques*. Berne, Switzerland, was selected as the home of the Bureau.



TELEGRAPH STATION AT ZANZIBAR.

The advantages of this union can only be fully appreciated by seeing what it does in the case of an international telegram. Suppose, for illustration, that a telegram should be sent taking in the entire telegraphic field of the world, touching at the most remote points, but never leaving the land line or the cable; that is, never being transferred by post or messenger from one point to another.

Starting at San Francisco, let the route run across the continent to New York by Vancouver and Montreal. From New York let it follow the world's northern telegraphic boundaries through England, Norway, Sweden, Russia and Siberia; going south, touch at Nagasaki in Japan, Hong-Kong in China, Singapore, Java and Sumatra, cross Australia, and land in New Zealand; returning to Singapore, let it cross to Bombay, make a detour to Ceylon, then on to Aden, round the Cape of Good Hope, leaving the line at Zanzibar to call at Seychelles and Mauritius, mount the West African coast to St. Louis in Senegal, cross the South Atlantic to Pernambuco, traverse South America from Buenos Ayres to Valparaiso, and then go north through Mexico to New York.

Now this imaginary route was submitted to Mr. Preece, of the English postal service,

by the writer, and returned with the assurance that it could actually be traversed as outlined at a cost of about 73s. per word. The time required would be something like fifty-six hours.

On this route the message would pass through the hands of the private companies of Canada and the United States, over the public wires of England, into the care of a private Danish company, the Great Northern, which would deliver it to the Russian State Telegraph. Carried by the latter to Vladivostok on the Pacific, the same Danish company transports it to Hong-Kong and delivers it into English hands. Private English companies, combined with Colonial and Indian Government telegraphs, carry it to New Zealand and thence to Aden. Seven different companies carry it around the Cape of Good Hope and across to South America, where its control is alternately private and governmental, until it falls into Western Union hands.

Every one of these various organisations guarantees its passage without inspection and does its utmost to secure a rapid and exact transmission.

Such a result alone would be a great example of the value of the international union. But it does more. It has made it possible that the cost of the telegram should

be made known in advance, and that instead of a list of the charges by the various Governments and companies concerned, in the puzzling moneys which they use, being given to the sender, he should have the total in a currency sufficiently well known the world over to be easily understood.

On this imaginary route seven kinds of money are used—pence by the English, cents by Americans and Mexicans, kronas by the Danes, copecks by the Russians, rupees by the Indian Government, reis by the Brazilians, pesos by the Argentines.

Now, to harmonise such discordant sums the convention decrees that the franc shall be the monetary basis of the union. Each country thus estimates the value of its currency in francs, and sends the results to the Bureau Telegraphique at Berne. Thus a shilling is valued at 1.20 franc; fifty kreuzers at one franc; a drachma at one franc; a krone at from 74 to 80 of a franc; four hundred reis, a franc; a piastre, 3.75 francs. Each member of the union also sends to Berne its tariff rates for international messages, which, as a rule, provide that nothing less than a certain fixed sum will be taken, and that each word will be charged at a certain rate. Great Britain accepts nothing less than tenpence for a foreign message; the Western Union will accept for a foreign telegram nothing under seventy-five cents, and the charge per word to London is twenty-five cents; Germany, five groschen (sixpence); Belgium, fifty centimes (fivepence); Italy, a franc (tenpence).

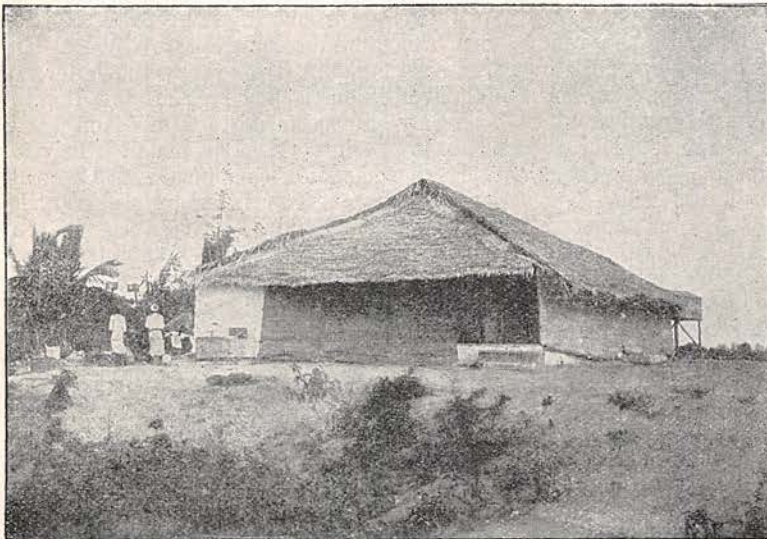
From Berne these rates are sent to the various Governments and companies, and used to make up their tables of charges for foreign telegrams.

At least four different languages are spoken by the officials who handle the above telegram—English, Danish, Russian and Spanish; but it goes around the world in English. Since 1891 it could be sent from any office of the states of the Telegraphic Union in any one of the following languages: German, English, Arabic, Armenian, Bohemian (Czech), Bulgarian, Croatian, Danish, Spanish, Flemish, French, Greek, Hebrew, Hollandish, Hungarian, Illyrian, Italian, Japanese, Latin, Malay, Norwegian, Persian, Little Russian, Portuguese, Roumanian, Russian, Servian, Siamese, Slavonian, Swedish, Turkish.

It is understood, of course, that all these languages are written in Latin characters, otherwise it would be impossible to transmit them, either by the Morse and Hughes instruments, or by the mirror galvanometers and siphon recorders of the submarine cables. By writing in Latin characters, then, a message in Japanese can be sent around the world, just as one in English. The Japanese themselves are obliged to send their messages in this way, even within the boundaries of their own country.

In certain countries, if the language employed is neither European nor Latin, the message costs more. Thus in England it is charged for at the rate of five letters to a word.

The union provides for secret language of two kinds: code and cipher. Code, or pre-arranged language, is composed of words the context of which has no meaning, but each word of which stands for a phrase or a sentence. Any two persons may arrange a code for private use. Large numbers have been published, some adapted especially to a particular business, others to the affairs of daily life. One of the most important undertakings of the Telegraphic Bureau

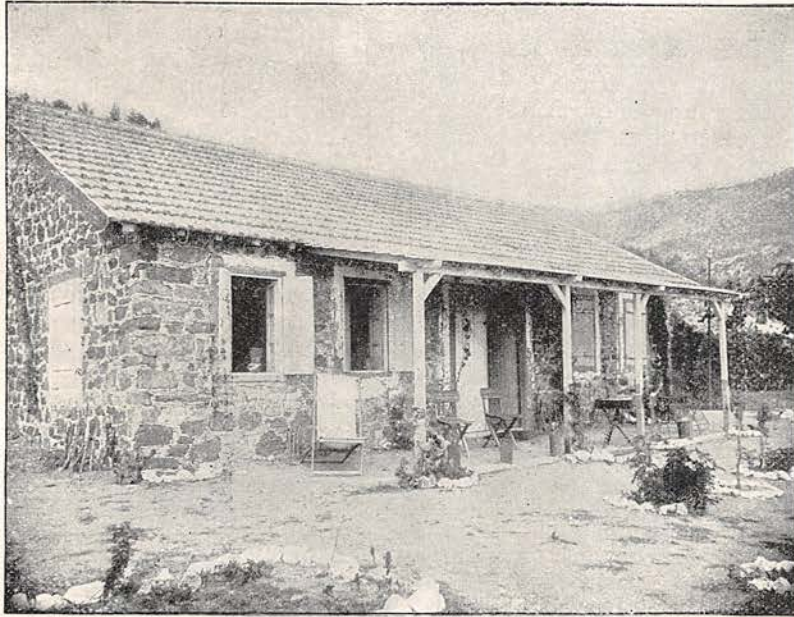


TELEGRAPH STATION AT MOMBASA, IN BRITISH EAST AFRICA.

of Berne has been the arrangement of an official code. This was decided on at the conference in 1890, but was not completed until this year. This code contains some two hundred thousand words taken from the German, English, Spanish, French, Dutch, Italian, Portuguese and Latin languages. It

sending, allowing multiple addresses for one message. Not that all these conveniences are perfect in all countries. Thus, in the matter of refunding money for telegrams which plainly have failed to give the idea desired, because of errors in sending, or which have been seriously delayed, there is still considerable variance. Bulgaria, Spain, Greece, Italy, Norway, Portugal, Russia, Turkey, and a number of South American countries refuse to refund. In Servia, if it can be proved that the fault is that of a Servian agent, the sum is returned. England refunds if the fault is in its service, but it is responsible for no loss to the sender on account of delay or mistake.

These international messages are paid for at the office from which



A SUMMER STATION IN THE ISLAND OF CYPRUS, OPEN FROM MAY TO NOVEMBER.

is to become obligatory in Europe three years hence, but will remain elective for all states of the union out of Europe.

As each word in the address of an international telegram is charged for, it is customary to register an abbreviated address if one has much business. Thus, "Warlock, London," is an abbreviated address for "Ward, Lock & Bowden, Limited, Warwick House, Salisbury Square, London, E.C."

The cipher telegrams are those made up of groups of figures having a secret meaning agreed upon between two parties.

Telegrams in secret language are not accepted for all points, in spite of the union. Thus they will not be taken for Bulgaria, Roumania, Servia, Tripoli, Turkey, and a few other points.

Many other decided advantages have come from the international union—insuring delivery, prepaying answers, registering messages, insuring that the message will follow the person to whom it is sent in case he has moved, refunding money if the telegram is too long delayed or is bungled in

they are sent, and once a month there is a settlement between the companies interested.

The money with which different countries and companies regulate their affairs differs, though the aim is to do all international transactions in francs. Austria, Bulgaria, Spain, France, Greece, Hungary, Italy, Portugal, Roumania, Russia, Servia, Switzerland, Turkey, and a few others use the franc exclusively. Brazil pays the Brazilian Submarine Company in national money. Cochinchina uses the franc with Siam, Tonquin and Annam, and the piastre with the Eastern Extension Company. Egypt employs English money with the Eastern Extension Company.

The payment for telegrams was formerly made in many countries by telegraphic stamps similar to postage stamps. They are still used in Belgium, Holland, and British India. The first country which adopted this custom was Spain; Germany, Bavaria, France, Great Britain, Italy, Switzerland, Württemberg, and others followed, but the system is falling into disuse, and is about to disappear. In certain countries telegrams

are stamped with postage stamps. This is the practice in Great Britain, Italy, and Hungary.

The carriers of the international and national messages of the world include 601,142 miles of land lines and 153,649 nautical miles of cable. Where the land lines run, all the world knows. They pass by our doors, criss-cross the sky as we look up in crowded streets, follow the railway tracks, climb over our hills, run into our country towns, fly into the wildest and most remote forests, and turn up in the most unexpected places—13 miles in St. Helena, 271 on the Gold Coast, a line across Zululand, another mounting 12,545 feet above sea level to Lake Titicaca, many miles in Madagascar. Even the savages of Africa, the camel-drivers of Persia, the rabbits of Central Australia, the unclad Malays, know the telegraph pole and line.

The cable is less familiar, but its circuits are no less daring. Look over a recent cable map. The red lines which mark the routes form a bewildering tangle. Twelve of them cross the Atlantic from Europe to North America, three swing from land's End to Lisbon, three from Spain to Brazil, two from Gibraltar to Alexandria, four down the Red Sea from Suez to Aden, three across the Indian Ocean from Aden to Bombay, two from Madras across the Bay of Bengal to Penang, and thence on by the Straits of Malacca to Sumatra, Java, Australia and New Zealand.

Every small body is crossed by one or more. The coasts of the continents are festooned with them. Even the cable map of the China Sea, Formosa Strait, and the Yellow Sea compares favourably with that of the Gulf of Mexico; and every now and then, all over the globe, the red lines run off to distant islands, as if they pitied their loneliness. From Halifax there is a red line to the Bermudas, from Lisbon to the Azores, from Hong-Kong to the Philippines, from Zanzibar to Seychelles and Mauritius.

This network of telegraphs is owned, when on land, usually by Governments; when under sea, by private parties.

The lines in Great Britain were transferred to the state in 1870, and since then their growth has been rapid. In 1893 there were in our kingdom 209,046 miles of line, of which 22,771 were private. Over these in the year ending March 31, 1893, 69,907,848 telegrams were transmitted. We pay an annual interest of £298,888 on the money invested in our telegraphs. As our net

revenue has usually been less than this, we have an annual deficit. In 1893 there was £166,682 lacking to balance the expenses.

In the British Colonies the telegraphs are, as a rule, under Government control. Canada is an exception to most of the British Colonies, the telegraph lines there being mostly private; 2,699 miles out of 31,841 belong to the state.

The United States owns no telegraphs. Her system is in the hands of the Western Union Telegraph Company and the Postal Telegraph Company. The Postal Telegraph was established to co-operate with the Commercial Cable Company, but it has proved itself a wide-awake rival of its big predecessor.

On the Continent the Government control of telegraphs is about complete, Austro-Hungary, Belgium, France, Germany, Greece, Italy, Portugal, Sweden and Norway, and Switzerland owning the lines, excepting those belonging to the railroads. Denmark possesses 2816 out of 3674 miles. Nineteen-twentieths of the Russian system is the state's.

Government control prevails in Japan. Persia owns some 3400 miles of single wire lines. There are also in Persia 675 miles belonging to the Indo-European Telegraph Company, and 415 miles on the Russo-Persian frontier belonging to the same company.

Brazil controls her lines; Argentine Republic and Chili perhaps half of theirs.

With a few exceptions the state telegraphs do not pay expenses. The principal deficit is in the internal service, the international service helping rather to balance the budget. But the rates are much lower on the state lines than on private lines, as a rule. In Great Britain the minimum rate is sixpence for the first twelve words, and a halfpenny for each additional word. In the United States the minimum is one shilling for day, tenpence for night, messages of ten words, with an addition of about one-fifteenth of this rate for an extra word. In Germany the minimum is sixpence, with an extra word of one halfpenny; in Belgium the rate is fivepence for fifteen words; in Spain, tenpence for fifteen words; in France, fivepence for from one to ten words. The words of the address are free in the United States, but they are counted in all other countries.

In the case of state telegraphs, too, the capital remains stationary. "Thus, in 1877," says Mr. Preece, "the capital of the British Post Office was £10,000,000, that of the Western Union was \$22,000,000. The capital of the latter is now \$123,000,000, while that of the former remains virtually

the same. Scarcely a single vestige of the old telegraph companies' systems purchased by the Government of the United States now remains. Whence, therefore, their splendid system of cables, underground lines, and new poles extending everywhere, and transacting an annual business of £2,500,000, instead of the £600,000 handed over to them. It has all been paid for out of revenue. The Government keeps no capital account."

The ownership of cables presents a strong contrast, only 16,171 nautical miles being in Government possession. France owns the most—4053 miles; Germany has 1761 miles, Great Britain and Ireland, 1759; India, 1974.

The remaining mileage of this great system (137,478 miles) is in the hands of twenty-seven private companies, the three largest of which are the Eastern Telegraph Company (26,028), the Eastern Extension, Australian and Chinese Telegraph Company (16,132), and the Anglo-American Telegraph Company (10,400).

It is commerce and competition which explains, as a rule, this extraordinary system of land and cable lines. They have been laid to meet the demands of business, and, for the most part, of a business already assured. Not that there are no examples of that admirable daring which, foreseeing a chance, makes its venture, preferring to create a demand rather than to follow one. A remarkable case of just such a venture was the laying of the first cable along the Chinese shore in 1871.

Russia had finished the land line across Siberia—the line which, it will be remembered, was intended to be part of the route so long projected into the United States by Behring Strait. But the American end of the project had failed, and Russia found she had an interminable stretch of line across her barren steppes, and now had nothing to attach the end to. In fault of anything better to do with the straggling terminus, it was carried to Vladivostok.

The Northern Telegraph Company of Denmark saw the possibility of utilising this end for a European communication with China and Japan—not that China and Japan had expressed a desire for such a union. The wily Danes took care not to ask permission, but slipped the land end of their cables into shore in inoffensive drain-pipes, and quietly made their connections until they had a cable running from Hong-Kong to Amoy, Gotzloff, Woo-Sung, Nagasaki (Japan), and connecting with the land line at Vladivostok.

When the Chinese wakened up to the presence of the cable, it was too late to object. They simply professed themselves utterly sceptical of its usefulness, and refused to have anything to do with it. However they soon had a practical demonstration of its capabilities. An Oriental, more bold than his compatriots, resolved to act on the price of rice telegraphed down to Shanghai from Peking, and to buy up a quantity. He did so, and made a big sum. Soon after, a lottery drawing came off in Peking, in which many residents of Shanghai were interested. The lucky numbers were telegraphed down, but the majority of the holders felt it unorthodox to trust to the impious Western contrivance which disdained time and space, two things which the Imperial Dragon himself had always respected, and they let their scepticism go so far that they sold their tickets for a song to more progressive gamblers. The next week, when the recognised post arrived, the report of the telegraph was confirmed. The new contrivance could not have had a more impressive advertisement.

The Great Northern Company, in venturing into Chinese waters to pick up the useless end of the Russian land line at Vladivostok, left a floating end at Hong-Kong, but immediately another daring company came on to meet it.

The year before, 1870, the famous Eastern Telegraph Company—the cable company which to-day possesses nearly twice as many miles of cable as any other in the world—had laid its lines from Land's End to Gibraltar, thence to Malta, and on to Alexandria. It had also laid a line from Aden to Bombay. On the other side of the Indian peninsula the Eastern Telegraph Company—to-day the second largest in the world—had picked up the end laid down at Bombay, and had run a cable from Madras to Penang, and from Penang to Singapore. When, the next year, the Great Northern appeared in Chinese waters, it was an easy matter to run up to Hong-Kong to meet it, and thus was furnished the last link in the tremendous circle which, beginning in England, crosses the north of Europe and Asia, passes down the eastern seas of Asia, and through the gulf of Bombay, the Indian Ocean, the Mediterranean Sea, and the East Atlantic, back to England.

It was the year before the Eastern Extension carried its cable to Hong-Kong that it concluded to go on to Australia, on condition that one or all of the Colonies combined

would lay a land line across the continent to meet it. This offer was accepted by the South Australian Government. This colony then numbered 170,000 inhabitants; it was in debt heavily for railroads and telegraph lines in the settled parts of its territory, but it bravely set aside the money for the new undertaking.

The work was begun early in 1870. The history of telegraphs does not include another so dramatic chapter. All but two or three hundred miles of the two thousand from Adelaide on the south to Port Darwin, the cable terminus on the north, was through a land of either the worst reputation or utterly unknown, save from the reports of the one

The northern portion of the work was once abandoned, so hopeless did it seem. Again terrific floods drove the expedition entirely from the field. In spite of the loss and discouragement the line was finished in two years and a half, and after October 22, 1872, the London papers were publishing daily despatches from Australia. On November 15, 1872, a grand banquet was held in London, celebrating the completion of the work, and at it was read a telegram of thanks in response to one of congratulation which had been sent to Adelaide just two hours before.

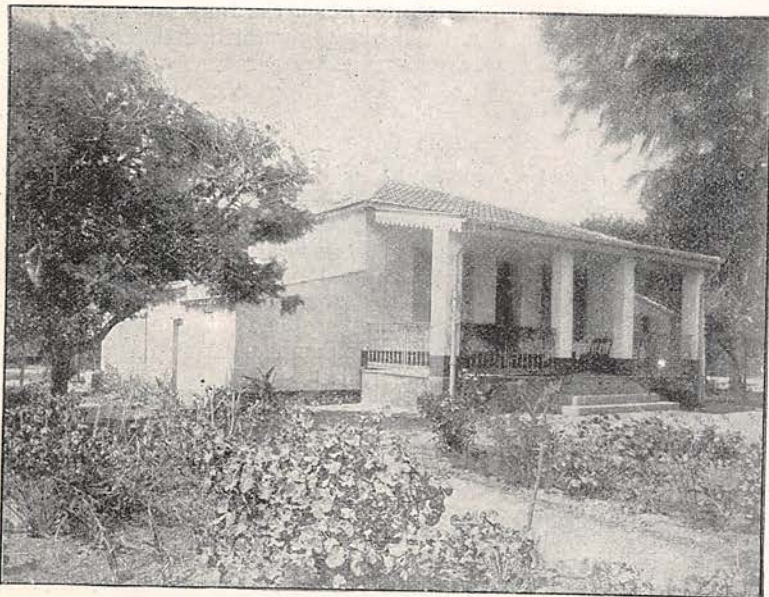
It was in this same period—between 1870 and 1874—that the skeleton of the world's

cable system was laid. In this time the Eastern Extension went on to Java (1870), thence to Australia (1871), and on to New Zealand (1874). The Brazilian submarine connected Lisbon and Pernambuco, and the Western and Brazilian the points on the east coast of South America, in 1874, and the next year there was a cable off the West Coast, thus completing the main features of the present system.

This network of wires has stolen around the world

almost noiselessly, and at present the most astonishing extensions go unnoticed. I heard an eminent telegraph administrator speak of this general indifference almost ruefully not long ago. "Nobody knows what we do," he said. "Here we are just about making connections with Borneo, and all that will be said about it will be in the notices in the telegraph stations: 'Messages received to Borneo after such and such a date.'" It is typical of the whole history of telegraph extension.

In spite of the fact that the land lines have frequently been carried over the wildest countries—the steppes of Siberia, the plains of Australia, the forests of Africa—and that the greatest hardihood has often been en-



CABLE HOUSE AT BONA, ALGERIA.

explorer who, with infinite risk and hardship, had traversed it nearly ten years before.

The expedition was to be baffled by nothing, however. They carted every inch of their wire, most of their poles, all of their supplies, across a country often waterless, and so hot that the thermometer burst and the pork melted in the brine. They saw their cattle die of hunger and thirst. They were forced literally to crawl through miles upon miles of scrub of the most exasperating character. The natives harassed them constantly, stealing their supplies, threatening their finished work, and rigging up their insulators as spear-heads, to use when the native boomerangs were not up to the occasion.



dured in construction, probably the worst enemy encountered has been and is the small boy who pegs stones at the insulators.

So true is this, that it is the custom on lines running through new countries to put



HIS EXCELLENCY IVAN DOURNOVO.  
(Minister of the Interior, and Director of the Telegraphs of the Russian Empire.)

up *old* insulators. The fever runs its course, and when the boys are tired of the sport the company repair the ruins with new crockery.

In certain cases iron-covered insulators are used. This is the case in Persia often, for there the camel-drivers do the damage. Passing along the road by which run the lines, they are exactly at the right height on their camels to clip the insulators with their sticks. Persian human nature would have to be vastly different from English to resist such a temptation, and it is not; so the company puts up an iron-covered insulator.

In South Africa a difficulty of the first lines is that the natives steal the wire to make bracelets and nose rings and other ornaments. This has been prevented in certain cases by carrying along a supply of a cheaper and more attractive wire with which to buy them off. In landing cables the same difficulty has been experienced, the small boy or the curious native cutting off fragments. But here the remedy is simple, and one dose is sufficient—it is to turn on the current.

At the head of this vast system of telegraphs, land and sea, is some of the finest scientific, organising, and administrative

ability in the world. Sir John Pender at the head of the Eastern and Eastern Extension Companies, Sir James Anderson, Mr. W. H. Preece, chief engineer of the British Service; Nielsen, of Norway, Mr. Thomas T. Eckert, of the Western Union Telegraph Company, United States of America; Arten Pacha, of Egypt, Dr. Rothen, the director of the International Bureau, are but types of the ability which is engaged in various ways in completing and directing the system.

Almost invariably these men possess the broadest culture, the largest knowledge of the world. They show—no class of men better—how, at the present moment of the world's history, her "biggest men" are in commercial and industrial undertakings; that there the finest diplomacy, the greatest ideas, the best statesmanship are at work.

To man the world's telegraph system a large demand is made upon the brightest youth of the world, for in no department of the business are the stupid available. A quick mind, a prompt action, a ready hand are essential to catch, transfer, and send on electric flashes. No figures are to be had to



From a photo by] [M. Vollemweider & Son, Bern.  
DR. ROTHEN.  
(Director of the International Telegraph Bureau, at Bern,  
Switzerland.)

show the total number of persons engaged, but Brazil employed in 1890 for her lines, 1418 persons; British India, 6611; France, in her Continental and Corsican lines, 58,001; Great Britain and Ireland, 117,989; Japan, 7140; New Zealand, 1154; Roumania,

1648 ; Spain, 3644 ; Switzerland, 1948 ; the Philippine Islands, 473.

In this same year Porto Rico had open 38 offices ; Russia, 3885 ; Norway, 354 ; Greece, 178 ; Germany, 17,454 ; Egypt, 172 ; Cochin China and Cambodia, 70 ; Belgium, 942.

The telegraph *personnel* is usually native. Thus in Persia, where there are about 3400 miles of single wire worked by the Government, the staff is entirely Persian ; in Japan and in China it is native. In the latter country the Danes have been the instructors. The success of the Danish Company in laying their cable along the coast induced them to attempt to run wires inland. They made a successful beginning, but were stopped oddly enough. There are no burial grounds in China, each family making a sepulchre for its dead upon its own premises. Dead ancestors are so revered that a shadow upon the grave is looked upon as an insult which must not be passed by. Now when the Danes began to put up poles for their wires, the shadows were sure, at some time of the day, to fall upon the grave of some Celestial's ancestor. There were constant disputes between workmen and natives, and the enterprise was seriously interrupted for a time.

However the convenience of the telegraph became at last so evident to the Chinese that the Government decided to go on with the work, and since, even the shadows on the ancestor's tombs have not prevented their setting up poles. The native staff received its first instructions from a telegraphic school started by the Danes, to whom also the Chinese owe their telegraphic alphabet.

As the Chinese use over thirty thousand characters in writing their language, it was by no means a simple matter to provide them

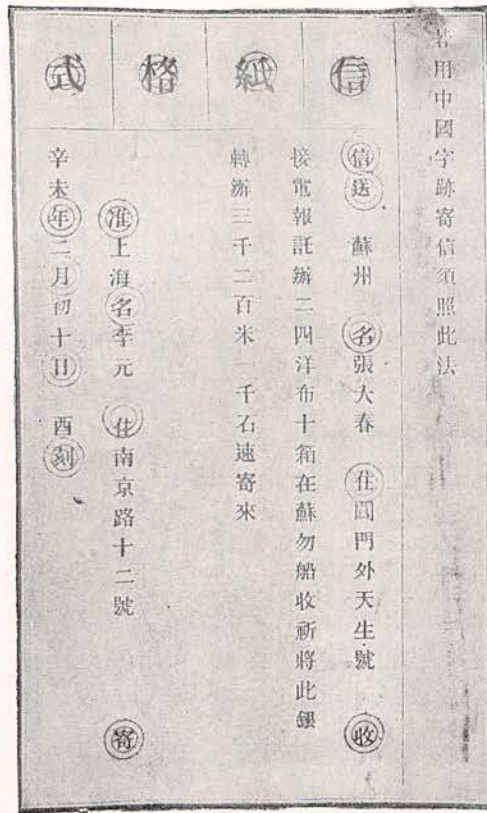
with an alphabet. The company employed to solve the problem a Danish professor of science, who had studied Chinese as a recreation. He selected six thousand characters in common use, and to each of them applied an arrangement of dots and dashes, thus giving to each character an appropriate telegraphic symbol. A little telegraphic dictionary was then printed, each character being accompanied by its appropriate telegraphic sign.

At first, in writing out messages, the telegraphic substitute was used, and the receiver of the message was obliged to read it by consulting his dictionary. As the lines had a rather limited *clientèle* then, this was possible. Since, the messages are written out in native characters, as in other countries.

The good opinion the Chinese now have of their venture is shown by the present extent of the system. Peking is connected with Tientsin, with the principal places in Manchuria, with the Russian frontier on the Amur and the Ossvri. All the chief cities in the Empire are in direct communication with the capital and with each other. From Canton a line runs to the capital of the Yonnen province, and beyond to the border of Burma. In 1892 the Chinese and

Siberian lines in the Amur Valley were joined, so that China is now in direct overland communication with Europe.

The amount of telegraphic business done annually is something astonishing. The number of messages reported in 1891 to the Bureau International was 295,678,651. The figures are still weightier if we consider the short time it has taken to reach them ; that is, if we remember what a new thing the telegraph itself is, how the first practical telegraph dates from 1837, Morse's first message from 1844, the first English tele-



A CHINESE TELEGRAM.

graph company from 1846; that in 1851 the whole number of messages sent in Great Britain was less than 59,000; and that the first cable, from Dover to Calais (a cable still in use, by the way), dates from 1851, and the first Atlantic cable from 1858.

The growth of business has been rapid since the completion of the international circuit. Thus, in 1870, in Great Britain the number of telegrams handled was 8,606,000; twenty years later it was 68,622,117. In 1870, in the United States, the traffic amounted to 11,500,000 messages; in 1890, 59,148,345. The inland traffic in India in the last twenty years has increased from 684,388 to 3,441,637 messages, and that between that country and Europe by all routes from 50,462 to 193,783. Everywhere the increase has been, if not always so marked, yet considerable.

Of course the lowering of rates explains principally the increase in business. This has been rapid the world over. The first tariff book of the Western Union Company gives the rates for 1866, the year of the consolidation of the companies of the United States. According to it the maximum rate between points in the United States at that time was \$14.70; now it is \$1.

When the first direct communication was made between England and India, the rate per word was five shillings; now it is three shillings and eightpence, *via* Turkey. The Atlantic cable of 1866 charged £20 for twenty words. This afterwards was dropped to £10 for twenty words. When competition with the first Atlantic cable began, the price of messages was brought down from £1 per word to £1 10s. for ten words. This

competition has been increased until now the rate is one shilling per word.

The capital engaged fits the figures above. The Western Union has a capital of £25,000,000, paying a yearly dividend of from five to seven per cent.; the Eastern Telegraph, over £6,000,000; the Eastern Extension Company, nearly £5,000,000; the Indo-European Telegraph Company, £450,000. The amount invested in Government telegraphs there is no means of knowing. In many countries it is not possible to

find out even the annual receipts and expenses of the state telegraph, since they are so mingled with the postal accounts.

Vast as the telegraph system of the world is, it is not complete. There is no way to reach Samoa but by post. None other to Alaska. The telegraph wire does not go everywhere. But it is fast lessening the number of places to which it does not go. A cable was finished last year from Singapore to the island of Labuan, on the north side of Borneo, and from there to Hong-Kong, which will consolidate the service of the Eastern Extension Company in the East.

A submarine cable between Australia and

Vancouver Island and San Francisco, touching at New Caledonia, the Fiji Islands, Samoa, and the Sandwich Islands, has been planned, and the first section, Queensland to New Caledonia, is laid. Every month sees new short lines running here and there by land or sea, and it is safe to say that no point on the earth's surface will remain long unconnected after it has proved itself of some use to the civilised world.



SIR JOHN PENDER.  
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