

TELEPHONE AND THE PUBLIC

Some Facts About the Growth of This Means of Communication.

ENGINEERING PROBLEMS OF SERVICE

Graduates of Technological Schools Are Now Devoting Time to This Branch of Applied Electricity.

BOSTON, Feb. 27.—(Special).—When a person says "hello" in Boston and another hears and echoes the word in Chicago or New Orleans, the process, simple as it seems to the modern man of business, has involved several hundred other people, each with a specially trained intelligence. The greatest marvel of the modern telephone is not that telephony is possible but that the thousand and one details of operating can be looked after so successfully. To accomplish all this enormous task, to keep the lines open, and the apparatus in order, and to meet the endless problems that arise in the installation of new services, the last two decades have seen the development of an entirely new profession into which hundreds of young Americans have entered, that of the telephone engineer.

The complexity of all work that has to do with electricity and the rapidity with which the use of the mysterious and seemingly miraculous current has become part and parcel of modern industrial and municipal life has made a thorough preliminary training the first necessity to the young man who enters any of the various departments of electrical engineering. At the Massachusetts Institute of Technology, for example, there were two graduates in electrical engineering in 1884, while today there are some 200 young men studying this one general subject and among them at least one in every six is especially interested in telephony. Yet these students, of course, represent only a fraction of the number of future telephone engineers now training at the various schools and colleges that have followed the institute's example in establishing courses in what is perhaps the most important of the modern "commercial professions."

Growth of Telephony.

The subject of telephony has grown to such proportions in the past decade that the idea of devoting a department of study entirely to telephone engineering has been more or less discussed in some quarters, but such an independent department could hardly be conducted satisfactorily, owing to the unavoidable close connection between the telephone and several branches of applied science. As a prominent telephone man has put it, "A good telephone engineer is practically all kinds of an engineer." In other words, the man who plans the installation of a telephone service encounters problems that belong to the mechanical engineer as well as to the electrical engineer.

The basis of the telephone engineer's training is such a knowledge of the highest mathematics as will enable him to make the endless computations necessary to the production of any plan, whether for a small induction coil or for the wires of a transcontinental system. He must know the length and breadth of theoretical electricity; he must understand the general phenomena and laws of sound, especially as they relate to speech and hearing; and of course he must be expertly familiar with the various details of telephonic communication and the installation and management of great systems. These things the technical school teaches him in lecture rooms and laboratories, by stress experiments, by observation and finally by actual working experience. As he advances, his work assumes much the character of professional talks with electrical experts, for men who are closely associated with the practical branches of applied science lecture at the institute on the latest developments of their special subject, and the laboratory equipment includes a miniature telephone system complete to the most minute detail.

No Limit to Service.

The engineer foresees the time when telephone communication will be a matter of course in every community; when not only will telephones be used more frequently than the mails or the telegraph, but when people will carry on long-distance conversations as naturally and with as little effort as they would talk face to face. In the light of progress in the last quarter-century it is not difficult to imagine such things, but the average telephone user of today has no more idea what the building up of such a universal system involves than he has of the tremendous engineering accomplishment which is placed at his service every time he talks over the wire. There are now something like 50,000,000 people in the United States who have access to a telephone and from their own locality they can talk over two-thirds of this country. But telephone development, although involving a problem of constantly increasing difficulty, has proceeded along the lines of least resistance; the first exchanges have been established in the larger cities and towns because here the demand was most imperative. Thinking together of these centers of population and the saturation of the intermediate country districts by means of telephone connections has been gradually going on at the same time with the steady improvement of the service offered by the great controlling Bell company; so that the sets of problems have required simultaneous solution.

The telephone receiver used today with all its increased efficiency is practically as simple as the one Alexander Graham Bell

exhibited at the Centennial exhibition in Philadelphia in 1876; but in the transmitter that stands on the twentieth century man's desk or hangs on the wall in his house a wonderful improvement has been made and in the development of the present well-nigh perfect mechanism millions of instruments have been thrown away to make room for better ones.

Cost of Accommodating Customers.

Today the current is sent out on a wire of copper instead of a wire of iron and is brought back on a duplicate copper wire instead of finding its way through the earth, which is generally charged with other electric currents. A wonderful economy of space has been secured by inclosing the insulated copper wires in cables, whether the lines are intended for overhead or underground structures, and the extent to which this economy has been carried appears in the fact that it is usual to have 400 pairs of wires in one lead-encased cable. The hanging of thousands of tons of copper in the form of thousands of miles of wire year after year is comparatively easy to understand, but in the exchange-clearing house where the copper nerves reaching thousands of different points are under instant control—a multitude of intricate and absorbing problems has been worked out.

As telephony has progressed and the use of telephones increased many fold the cost of the instruments themselves has decreased, but the investment required for the "central" plant has grown tremendously larger. Few people realize that the switchboard through which their daily communications are made costs many hundred thousand dollars, or even, in a city like New York, several millions. They do not realize that it is a very elaborate piece of mechanism made up of millions of small mechanical parts all of which must be adjusted with the most painstaking exactness, nor that in talking 1,500 miles, say from Boston to Kansas City, they are given the exclusive use of property which has cost probably \$500,000 and the assistance of twenty-five operators and that no one else can use for the time being the 3,000 miles of wire which if melted into one ingot would weigh over 600 tons.

All the work of the engineer and mechanic which is at the immediate service of anybody anywhere merely for the ringing of a bell, costs enormously. The hundreds of millions of poles must be frequently renewed at great expense and the switchboards costing fortunes are hardly installed before they must be replaced to include some new invention or thrown on the scrap heap to make way for a more perfect and efficient system. No price is too high to pay for the best possible service and the best possible service is demanded quite as vigorously by the Bell company, which has already covered so large an area with its wires and which leases its apparatus rather than sell it, as so to make sure that it shall be properly maintained and kept up to the standard, as by the customer. Competing companies organized on the theory that wires and equipment would be unaffected by time and that a switchboard once installed would become a permanent source of revenue, have often come to grief because they have not correctly gauged the requirements of the telephone using public or the expense of maintaining and developing a satisfactory system.

Trend of the Progress.

All this time the inevitable progress of telephone engineering has been toward universal service. The public has not seen it but the telephone engineer and the telephone manager have seen it and have been working with this great problem constantly in view. There are greater mountains to be crossed with pole lines, greater perfection of apparatus to be achieved, and a better organization of various systems to be established before a universal telephone system can become a reality. The financial problem connected with a telephone system perfectly adapted to the purposes of the 50,000,000 American people is a weighty one. When that condition approaches, there will be no question of competing lines or of opposition companies. Every user of a telephone will want to be in touch with every other user of a telephone through a single system which will be adequate and complete. When such a system is realized, and it will be, the engineers say, before another generation, it will be the most comprehensive business utility the country has ever seen, and for its completion the force of telephone engineers, trained by the most careful and thorough methods of modern technical education, must be largely increased year by year.

Glimpses Into Mythology.

Stentor was being ridiculed about his loud voice. "I know it's fierce," he bellored. "I wonder if I couldn't sell it to the half-breeds."

Grabbing his fountain pen he wrote a letter to Madison.

Terpsichore was sulking in a corner of the ballroom.

"How do you like the party, Cora?" asked Mercury.

"Pretty punk," she declared. "I can't see no sense in having so many of them there quadrilles."

Unable to comfort her, Mercury ordered her carriage.—Milwaukee Sentinel.

PRATTLE OF THE YOUNGSTERS.

Ernie—Papa, what goes around a bottle?
Papa—That is easy, little girl—a button-hole, of course.
Ernie—No, that is not the answer.
Papa—Well, I give it up; what is it?
Ernie—A billy goat.

Alma's little playmate was taken down with scarlet fever and the home was quarantined, a card being tacked onto the house giving the nature of the disease.
A day or two later Alma came running into the house and exclaimed: "Mamma, Bessie is getting better; the sign is nearly all gone."

"Why, Freddie," exclaimed the excited mother. "What did you drop the baby for?"

"Because," answered Freddie, "grandma said he was a bouncing baby and I wanted to see him bounce."

"Come, now," said mamma, who had taken the children for a walk through the zoo, "let's go home and see papa."

"Oh! no," protested Elsie, "let's see these other monkeys first."

Johnny—Grandpa, have you any teeth?
Grandpa—No, my child, they have all gone.

Johnny—Then I think I'll let you hold my candy while I run an errand.

"Where does your brother go to school?" asked the teacher of the fourth grade school girl.

"Oh, my brother goes to the high school," answered the maid proudly. "He's a salt-moore now, for he was a freshman last year."

The street car conductor, uncertain as to whether she was old enough to demand a fare from, asked:

"Little girl, how old are you?"

"Ask that of Ann," replied the little miss. "Keep your statistics to yourself and accept this 5 cents from me."

The kindergarten teacher had been giving her class a little talk about the moon.

"And now," she asked in concluding, can anyone tell me why we can't see the moon when there is a storm? It had rained the preceding night.

Young Eddy had a reply. "Why, 'cause," said he, "if the moon came out the rain would put out his light."

"Moral courage," said the teacher, addressing the juvenile class, "makes one do what he thinks is right, regardless of the jeers of his companions. Now, Johnny, can you give me an illustration?"

"Yes, ma'am," answered Johnny. "If a feller has candy an' eats it all himself an' ain't afraid of th' other kids callin' him stingy that's moral courage."

OUT OF THE ORDINARY.

Port Arthur and Cincinnati are in the same latitude.

There are seventeen metals which are more valuable than gold.

A bushel of wheat, by actual count, has been found to contain 89,730 grains.

A deputy in the Parliament of France receives \$300 a year, free transportation and free lunch.

Every year more than 50,000 Japanese youths qualify by age for regular military service, and 200,000 begin to serve either with the colors or as supernumeraries.

One of the largest forests in the world stands on ice. It is situated between Ural and the Okhotsk sea. Sometime ago a well was dug in the ice, when it was found that at a depth of 200 feet the ground was still frozen.

Emil Kuehnelt of Manchester, N. H., has a clock which, it is believed, was used in the days of Columbus. On the upper part of the wooden face is carved a picture of the great discoverer, while on the lower part is neatly carved "Anno, 1492."

The highest altitude ever reached by human beings is six and a half miles. At that height the breathing of oxygen from tubes is necessary to life. A balloon, unoccupied, has reached a height of thirteen and a half miles, as shown by self-registering instruments attached to it.

Cleanliness is not understood in Tibet. What serves as clothing by day serves as bedding by night in the thibet, which constitutes a man's lot of clothes, is simply unground when he lies down to sleep. It is neither changed nor washed until it goes to pieces. The man inside the bathrobe fares no better.

Mount McKinley is known to be the steepest of all the great mountains of the world, and it is unlike most other great peaks from the fact that arctic conditions begin at its very base. The prospective conqueror of this immense uplift must pick his mate over broken stones, steep slopes, sharp cliffs, and an average slope of 45 degrees for at least 14,000 feet.

A sarcophagus, by the use of which one may evade the sentence, "dust to dust," has been patented. The remains are first surrounded with a coating of sodium silicate, or water glass, which is allowed to dry. When the water has been sufficiently evaporated, the subject is placed in a mold which is to determine the size of the glass block, and the mold is filled. The use of such transparencies in the hall of fame would be a national economy.

Representative Maddox of Georgia, who is soon to retire from congress, has received this letter from a constituent: "Dear Mister Kongressman: Sun time I wrot you asking if there were any thing you could do to make a Arthurs behave himself. I shd heard from you and things is no better. Will you please let me know how I can get one of them big pen knives from Africa. I have always voted for you and this is my litle to tell you I love you."

In one of his more recent hysterical bursts Rev. Dr. Parkhurst said, in discussing Abraham Lincoln: "As to his mother, Nancy Hanks, the kindest treatment we can give her is to bury her with a stone over her head."

Considerable indignation has been aroused by this remark, regarding which several protests have appeared in the papers. One writer says that Dr. Parkhurst is most effectively answered by Abraham Lincoln's own statement: made in mature life: "All that I am or hope to be I owe to my angel mother."

LABOR AND INDUSTRY.

The center of the country's cotton growing is near Jackson, Miss.

An electrical bootblack, which is more rapid and effective than the street Arab, is in use in Chicago.

The Pennsylvania railway east of Pittsburgh handles 75,000 tons of freight for each mile of its length, its annual earnings being \$105,000 a mile.

The center of the production of the most important cereals—corn, wheat, oats, barley, rye and buckwheat—taken in the aggregate, is in Illinois, a few miles north of Quincy.

From one factory in the United States goes each day to every part of the globe electrical machinery to produce more than 8,000 horse-power, making this daily addition to the working power of the world.

The 5,000 miles of transatlantic railway cost \$44,544,415, or \$8,900 per mile, for sixty-two single tracks. The ministry of ways and means of communication has found it necessary to enlarge the rolling stock of the fourth-class service to 7,000 cars, to be used for transportation of laborers, emigrants and recruits.

Britain India had in 1885 sixty-two cotton factories, with 1,841,000 spindles and 13,600 looms. Now the number of spindles is 20,000,000 and the number of looms nearly 44,000. The capital invested in these establishments is \$80,000,000 and the number of persons employed in the industry is over 1,500,000.

Statistics compiled by the Zemstvo of forty-nine provinces of European Russia showed that 85,100 peasant families, representing a population of perhaps 1,000,000, had only nine acres of land per family; and that 2,125,444 families, representing a population of about 18,000,000, had only twenty-one acres each, although hundreds of thousands of households consisted of from eight to twenty-five members.

A London paper, speaking of the "American invasion," relates that an enterprising Yankee came over to England and decided to open a shop in Birmingham. He obtained premises next door to a man who also kept a shop of the same description, but was not very pushing in his business methods. The methods of the Yankee, however, caused the older trader to wake up, and with the fourth opportunity he gave upon him he affixed a notice over his shop with the words, "Established fifty years."

Printed in large letters. Next day the Yankee replied to this with a notice over his store to this effect: "Established yesterday; as old stock."

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March 1 to April 30.

That long-looked-for California opportunity is here at last.

March 1 to April 30, the Rock Island System will sell "colonist" tickets to principal points in California at these low rates:

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\$750 GIVEN AWAY FOR CORRECT ANSWERS OF THREE NAMES.

The above are pictures of the Presidents representing the names of two large cities in the United States. One is located in Nebraska and one in Ohio. The center space is left blank for a third President, whose name represents a prominent city, spelled in the letters and the only city in the U. S. the people are allowed to vote. If you can **GIVE THE NAMES OF THE THREE CITIES**, which may entitle you to the whole or part of the \$750.00, for the correct solution of above names send a few minutes of your time. You are not called upon for one cent of your money to be a participant in the **AWARD OF \$750.00. WE DO NOT WANT YOUR MONEY.** Should more than one have correct answer, \$750.00 will be paid out the same pro rata. We advertise ourselves in this liberal manner to interest you, and we will surely give away \$750.00 besides valuable presents, as there are no blanks. Send your name and answer at once. A. J. BILZ, Pres. 805 2nd Floor Bldg. 25, 7th St., Omaha.

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2011 South Second St., SEATTLE, WASH., July 14, 1908.

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Marjory Lane Peters
Proprietress of White Fawn Creamery, No. 311, Degree of P. O. S. E. S.

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Miss Marjory Lane Peters
2011 So. Second St.
Seattle, Wash.