Society of Wireless Pioneers - California Historical Radio Society

Western Electric Company 1869-1944

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Zhis booklet, which was prepared as a part of the observance of our Company's 75th Anniversary, is presented to all employees having five years or more service, and to all retired employees.

Western Electric Company 1869-1944



This booklet was prepared as a souvenir of the Company's 75th Anniversary.







WE HAVE COME A LONG WAY A tribute and a report

N THIS 75th Anniversary the Western Electric family, in coping with the production problems of this war, has derived strength and inspiration from the inheritance handed down by the thousands of former employees whose careers have enriched the Company's history. Our abilities and energy, now devoted to the war efforts of our country, are the extension of their work; our esprit de corps is the fruition of their ideals.

Were it possible on this Anniversary to communicate with just one, and only one, of those called from our ranks during the 75 year journey, in order to recount important events in Western Electric's history, it is believed that such a report would be addressed to Enos M. Barton, one of the founders of the Company. Obviously a complete story could not be undertaken, but a letter to him might run something like this:

Dear Mr. Barton:

We have come a long way since that day in 1869 when you and Professor Elisha Gray went to General Anson Stager in Cleveland with plans for a partnership. You told him how you wished to convert your little model making shop into a small factory. You hoped to manufacture Professor Gray's printer telegraph, along with better Morse telegraph instruments and other greatly needed electrical devices which were coming into being. That small business of yours needed more capital, and we know General Stager consulted his counsel about becoming a partner. Lawyer Norman Williams, you will remember, told him his investment could have no more protection than his faith in the "character and abilities" of you and Professor Gray.

It must have been a happy moment when General Stager summoned you and Elisha Gray to tell you he had the necessary faith. We, your successors, have made it our goal to continue to justify that faith and to try to prove worthy of your example, your ideals and your faith in the Company and its future.

This report is made to you exactly seventy-five years after the establishment of Gray and Barton at 93 St. Clair Street, Cleveland. It is presented at a time when the Western Electric family comprises 100,000 men and women. With all the Company's resources and facilities, they are mobilized in the cause of our country and her Allies who are now waging the greatest and most terrible war the world has known, to insure for the future the freedom of all people. Our record breaking production of communications equipment for use on all the fighting fronts is an outgrowth of the spirit of team work you inaugurated and nurtured which has ripened into a Company tradition.

In preparing for this 75th Anniversary we have uncovered many facts and incidents unknown to the present generation. The recounting of these discoveries and other important events, including much that is familiar to you, will afford a perspective on the subsequent developments of the Company.

The original four story building where the firm of Gray and Barton began its career in a loft 25 feet wide, is still standing on St. Clair Street. Copies of Cleveland's 1869 Directory show that you and Professor Gray lived together in a house near the shop, and you will be interested to learn that the mansion where General Stager resided has continued to be the home of the University Club of Cleveland since 1911.

To glean every fragment of the history of those Company beginnings we have searched through numerous old records, including the first minute books, your writings and the memoirs of your associates. We have discovered a wealth of material in documentary form, one of the choicest items being the first Gray and Barton ledger which you posted in the old time manner — while sitting on a high stool in front of a sloping desk. You were the Company's

first salesman; and judging from the business shown in the ledger, we can easily conclude that many of these entries were made at night after daytime hours spent demonstrating the then astonishing workings of electric annunciators, burglar and fire alarms, or assisting Professor Gray with his experiments when you weren't busy with Charlie Lewis, your first foreman, and his handful of workmen who operated the half dozen foot lathes.



GENERAL ANSON STAGER

That first old ledger of our Company discloses the extent of the sales to the nation's railroads of Morse instruments and electric signalling devices essential to safety. Western Union was our best customer and the promotion of General Stager to the Vice Presidency of Western Union and his location in Chicago was one of the reasons for moving our headquarters to Chicago and establishing our main shop there, the Cleveland shop remaining as a branch of the Chicago shop for about one year.

In order to obtain a location for our headquarters and main shop in Chicago you bought the L. C. Springer shop with a \$500 note endorsed by General Stager. This was at 162 South Water Street but unfortunately our search has produced no photograph of it; nor do we have photographs of the next two shops at 13 South La Salle and 479 State Streets, into which we successively moved to care for the expansion of our business. C. H. Hobart, the sole survivor of the little band who took part in those early Chicago moves, is still living and has told us what he remembers of Gray and Barton days. At 94 he is hale and hearty in his California home.

That the Gray and Barton shop was spared when the Chicago Fire of 1871 burned within two blocks of it seems an act of Providence. The activities of you and Professor Gray in restoring Chicago's electrical installations by supplying material and directing the electricians, established the precedent of emergency service in the wake of disaster which has become a tradition in the Western Electric Company. Your help in restoring the local telegraph system of Western Union certainly merited their joining with General Stager in 1872 in organizing the \$150,000 Western Electric Mfg. Co. as successor to Gray and Barton. This was a large step in the development of our Company.

It has stirred our pride to note how rapidly you, Professor Gray and General Stager, became identified with the leading business and civic interests in Chicago. While you and Professor Gray were largely absorbed in inventing and producing finer electrical instruments and appliances, General Stager, in 1872, must have won considerable prestige for the Western Electric Mfg. Co. as its President. You will recall that in the Civil War he had been the first to apply the electric telegraph to warfare and devised a secret code which the Confederate Army never deciphered. Later as Chief of **U**. S. Military Telegraphs he became an intimate of Lincoln and Stanton. In 1867 he was chosen as mediator in the famous dispute between the various regional units of the Associated Press. As a leading citizen of Chicago his responsibilities came to include :

Vice President and General Manager of Western Union Organizer and President of Chicago's first electric light company Vice President of The Babcock Company Director in four railroad companies Director of the Northwestern National Bank Organizer of the Chicago Chamber of Commerce President of The Calumet Club Vestryman of The Episcopal Church First President of The American Electrical Society

He also became the first President of the Chicago Telephone Company and principal owner of a dozen smaller telephone companies in the mid-west.

We have learned that in the earliest years the Company's shop was a mecca for inventors. By 1872 Professor Gray had cleared up interference claims against his printer telegraph and obtained its patent. Western Union had selected the Gray "printers" as standard equipment for their subsidiary, the Gold and Stock Telegraph Co., and the Gray "Eleven call box" was being ordered in increasing quantities by the American District Telegraph Co. which was opening offices throughout the country. After the Western Union Company sold to us their Ottawa, Illinois shop, and transferred its fine tools and skilled workmen, it commenced ordering Morse instruments by the hundred in contrast to former orders for dozens. At this same time it authorized capacity production of the Gray "printers". This increased business necessitated another move to expand our capacity, as a result of which General Stager built the Kinzie Street shop and leased it to the Western Electric Mfg. Co.

You recall that your old friend Marshall Field told you he had always found that "what was best for his customers was best for him," and how you passed on that slogan to Charlie Lewis, "Old Man" Warner, and others in the shop, to inspire them to strive for ever increasing quality and finer workmanship. Warner had helped Samuel Morse make his first telegraph instruments. We had other notable workmen in that Kinzie Street shop, craftsmen second to none in the infant electrical industry.

In this era a Western Electric man invented an electrical device to explode powder charges. While its first application was for peacetime blasting it was later made available to the government for wartime use. Professor Gray was the first to apply the annunciator as a signalling device for electric elevators, and the Company's fire and burglar alarms, electric gas lighters, arc lighting systems and police call boxes took foremost place in their fields against those of all competitors. Our equipment was installed in leading residences and business houses throughout the land.

The reports of Edison's first demonstration of his double transmitter relate that it took place between Rochester and New York in December 1868, Edison going to Rochester to handle that end of the trial while you still were Western Union's day chief operator there. This early experience demonstrated to you the possibility of a greatly expanding communications industry, and the close association with your old friend, Thomas A. Edison, proved of great value later on. That friendship must have stimulated you and Professor Gray in carrying out your ambition to push back the horizons of the known electrical field. We can easily imagine how elated you and your employees were when, about 1873, Professor Gray, using his harmonic telegraph, transmitted music over a Western Union circuit from an office in Chicago to Milwaukee and back to our Kinzie Street shop. This demonstration must have been considered a remarkable accomplishment in this early period of electrical development. Professor Gray obtained many important patents in telegraphy, telephony and electrical signalling. The diversity and extent of his contributions to the communications art afford us increased pride in the fact that he was your partner in the establishment of the company and also our first engineer.

We cherish the historic part the Western Electric Mfg. Co. had in the births of the world's first commercial typewriter and the incandescent lamp.

We have learned that C. L. Sholes brought to you and General Stager an early model of the Sholes and Glidden Typewriter. The business representatives of the inventors insisted that they wanted

the machines manufactured by thousands because they hoped "to free the world from pen slavery". Being mindful that the Company's capital of only \$150,000 was hardly adequate to meet your plans for the building of a great electrical industry, you were not willing to undertake this new venture in a field so foreign to your basic business. Accordingly it occurred to you that the Remington Arms Company, which had expanded its arms making fa-



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WILLIAM S. SMOOT

cilities during the Franco-Prussian War of 1870, might now need some peacetime business. So you went to Ilion, N. Y., and conducted negotiations with one of their trustees, William S. Smoot.

We are told that you stayed over Sunday in Ilion, hearing Mr. Smoot, then locally famous as a Sunday School teacher, deliver a lecture on the Bible. The next day you arranged with him to have the Remington Company manufacture the typewriters, and agreed that the Western Electric Manufacturing Company would aid in the redesign of the typewriter and act as exclusive sales representative. The first lot of the original 500 machines contracted for was delivered at Chicago in 1874. Mark Twain bought one from the original lot. The typewriter was later exhibited at the Philadelphia Centennial Exposition of 1876.

In that same year under a contract with Thomas A. Edison you began the manufacture of the Edison Electric Pen, the predecessor of the modern mimeograph. This was also exhibited at the Philadelphia Exposition, where we won five first class awards for electrical devices of our manufacture. It was at this time you hired F. R. Welles as our first stenographer.

But let us remind you of your relationship with the advent of the incandescent lamp. While we were manufacturing and distributing the electric pen and Edison's improved telegraph apparatus, you wrote to encourage him to hasten the development of his idea for a nonconsuming candle, and suggested his visiting Philadelphia to see one of Brush's electric dynamos. This letter, in which you urged him to concentrate his energies on its invention, was written in 1877, a full year before his lamp was patented.

The year 1876 records an event which altered the course of Western Electric history, when on March 7 Alexander Graham Bell was granted his telephone patent.

As had been the case with telegraph transmitters and receivers, or registers, of varying construction and performance, inventors of the new era now worked diligently to contrive unique and patentable telephones. Professor Gray had developed one independently of Bell, as had Amos Dolbear. Edison also patented the first carbon transmitter.

In this confused patent situation, and before the telephone exchange became a factor, we see how you and your friends in Western Union may have minimized the future of the telephone. But when Bell telephones began competing with Gray "printers" among the customers of Gold and Stock Telegraph Co., and when the demand for A. D. T. call boxes began to decrease in favor of direct speech over the new telephone, we can understand the reasons which led to Western Electric's entrance into the telephone field. Your own story and the writings of other pioneers tell us how we began both telephone manufacture and the organization of a number of mid-west telephone companies in 1878-79. You relate that we made these telephones under the Gray and Edison patents.

Just prior to starting the manufacture of telephones we find that you received a letter from a Toledo judge, commending to you the services of his young son, Charlie. The judge asserted that his son had so much electricity in his head he could not be kept in school. Such was the beginning of the career of Charles E. Scribner, destined to become the telephone engineer who during his lifetime was to do more than any individual except Bell to further the art of speech transmission in those early days of the telephone, and who was awarded 441 patents on his inventions.

You first met this "boy inventor" when the Kinzie Street Shop made a model of his telephone relay. Soon after, you put him on the payroll. Before he was of age he had invented the jackknife switch and the Scribner Switchboard, a great forward step in making practical the inter-connection of many telephone subscribers.

With telephone business thriving, and during the spirited rivalry with the National Bell Telephone Company, then expanding from Boston, Western Union sold us their New York shop at 62-68 New Church Street in 1879. George Phelps, famous as an instrument maker and inventor, had produced the Crown telephone receiver and became our first New York shop superintendent. We were making a bid for the telephone business in the east while General Stager proceeded independently to organize numerous telephone companies in the west, including the first Chicago Telephone Company and others at such important centers as Indianapolis, Ind. and Rockford, Ill.

The patent difficulties had not yet been clarified but had boiled down to the Bell-Western Union contest in the so called Dowd case of 1879. Western Union officials offered a compromise before the court verdict was rendered. The Bell officials accepted this offer which provided a 20 per cent royalty to Western Union upon all Bell telephones rented, in exchange for the Western Union patents and a transfer of all Western Union telephone exchanges and telephones to the Bell Company at cost. The Telegraph Company withdrew entirely from the telephone field.

By this compromise the Western Electric Mfg. Co., closely identified with Western Union interests, stood to lose its telephone manufacturing business as it had no license to make Bell telephones. The future must have looked dark to you and this situation perhaps influenced your judgment in deciding to enlarge the Company's facilities to manufacture power and lighting apparatus, for we had already installed Chicago's first commercial electric lighting system and had done much pioneer work in improving motors, generators and the like.

Reporting in a recent year upon those days, a high government official said of the Western Electric Mfg. Co.:

"It had also built up the largest business in the manufacture of general electrical apparatus and equipment. By 1880, it was the largest electrical manufacturing company in the United States. It controlled the ablest staff of inventors, the largest staff of skilled workmen, the best tools, and a superior shop organization."

In 1880 the American Bell Company was organized and took over the National Bell Telephone Co.

Fortunately the wisdom of General Stager and Theodore N. Vail prevented us from abandoning our telephone manufacturing activities. General Stager personally owned a controlling interest in ten or twelve of the largest mid-west telephone companies, and, following the compromise, he arranged for Western Electric to buy a controlling interest in the Gilliland Electrical Mfg. Co. of Indianapolis which was a Bell manufacturing licensee. He then pointed out to Mr. Vail the need for one strong manufacturer of standardized telephones and telephone equipment, emphasizing the value of the Scribner switchboard and various other devices, the patents for which we held.

While competing with all Bell manufacturing licensees, you and your staff proved that the quality of our products was superior,



convincing Bell officials that Western Electric Mfg. Co. was the logical organization to become the manufacturing unit of the Bell System. These plans involved our absorption of the Charles Williams Jr. Co. of Boston, another Bell manufacturing licensee, and our acquiring complete ownership of the Gilliland Company of Indianapolis. Following these steps General Stager arranged for the purchase of Western Union's interest in our Com-

ENOS M. BARTON

pany by the Bell organization in the summer of 1881.

With these consolidations it was necessary to expand further the capital of the Company and as a result in November, 1881, it was reorganized as the Western Electric Company of Illinois with a capital of \$1,000,000 in which the Bell Company acquired a majority interest. General Stager was named President and you became Vice President. Within the short span of 12 years the little beginning you and Professor Gray made in Cleveland had grown into an industrial organization of great size, for those times, and one about to make tremendous contributions to the country's technical progress in the electrical field.

You had sent F. R. Welles to Australia in 1880 to determine business possibilities there, while you and Mr. Scribner visited Europe for the same purpose and to obtain necessary patent protection. Your visit resulted in the opening of the Company's first foreign factory at Antwerp, January 1, 1882 with Mr. Welles as Manager. From that beginning, and largely under Mr. Welles' direction, we developed the world-wide telephone business which led your lieutenant of later years, H. F. Albright, to declare that we "had helped to make the whole world neighbors". When we entered the Bell System in 1881 there were less than 70,000 telephones in the United States; by 1882, when we signed the original manufacturing contract, that number had grown to more than 90,000; and by 1883, when we moved into the new building you had erected at Clinton Street, Chicago, the nation had 123,600 telephones.

In January 1885 General Stager's health made it necessary for him to resign and in selecting a successor we can understand how your mind turned to Wm. S. Smoot, of the Remington Arms Company, whom you had first met in connection with the typewriter business, and how a look into his record by Bell officials soon corroborated your judgment. He was the son of Captain Joseph Smoot, U.S.N., hero of the U.S.S. Hornet which defeated H.B.M.S. Peacock in the War of 1812. Besides being a typewriter expert he was the inventor of many improvements to the rifle during and after his service as a lieutenant of ordnance in the Civil War. He had invented Remington revolvers 1, 2 and 3, and became noted as a production expert.

General Stager survived his retirement from the Presidency by only a few months and died in March 1885. He was a foremost figure in our country's industrial life and it is of interest to know that during the thirteen years of his Presidency he never accepted any salary. The fact that Robert Todd Lincoln, Marshall Field, Charles Fargo, N. K. Fairbank and Martin Ryerson were among his pallbearers attests the esteem in which he was held.

Mr. Smoot lived but one year after he became Western's President, yet we have learned how he brought his production experience to bear upon our problems by a reorganization of the manufacturing facilities, one accomplishment being the consolidation of the Charles Williams Jr. plant, formerly in Boston, with our New York shop on New Church Street.

1886 was a great milestone in your life for it was then you came into full executive authority over the Company you had helped found. You had won the Presidency by your 17 years of notable service. In New York a young New Englander, Harry Bates Thayer, whom you had hired in 1881, was proving himself an extraordinary business-getter and Manager. The Company's eastern manufacturing branch had outgrown the old Western Union shop. You authorized the building of a new ten story plant and warehouse at Thames and Greenwich Streets, occupied in 1888. There were now approximately 200,000 telephones in the United States. We had become one of the largest units in the Bell System, and our electrical manufacturing business had been widely extended throughout the world. Our growth had paralleled the growth of the nation from reconstruction days through the new era of invention and industrialization.

In the year 1890 America proudly decided to hold a World's Fair in 1892. This announcement caused the Bell System to undertake building a record breaking long distance circuit over the 900 miles between New York and Chicago to be ready for the opening of the Fair. You will remember that the line was ready but the Fair was not. Nevertheless the line was personally opened by Alexander Graham Bell in 1892 and was in full operation several months before the delayed World's Columbian Exposition opened in 1893.

In preparing for our 75th Anniversary we discovered an old book about that Exposition, picturing the Electrical Building with its thousands of electric lights, the first ever to be so brilliantly illuminated. Undoubtedly you have read the following quotation from this book written by J. P. Barrett who had charge of the Electrical Building and its exhibits:

"By all odds the most attractive and popular exhibit in the Electrical Building, and one of the most interesting at the Exposition, was that made by the Western Electric Company."

He also described the greatly improved multiple drill press and automatic screw machine invented by Briggs and Oehring, of our Company's staff, and listed the ten major awards this \$100,000 Western Electric exhibit received.

The World's Fair in 1893 seems to have been the beginning of the Company's organized selling, marking a new departure in our domestic system of merchandising. By 1900 our business in power apparatus and electrical supplies had given us a substantial purchasing power and it became evident that if the purchasing power of the various telephone companies was combined with the purchasing power of the Western Electric Company a substantial advantage in the buying for the whole System could be obtained. This plan was first discussed by Mr. Thayer and Mr. Spencer, General Manager of the Bell Telephone Company of Philadelphia, and the first supply contract was signed with the Philadelphia Company in 1901. By 1913 supply contracts had been executed with all the associated telephone companies in the Bell System.

In 1897 the expansion of the business made it necessary to erect a new building at 463 West Street, to serve as the New York headquarters of the business and to house the New York shop. About this time we first adopted dimensioned drawings of piece parts, the use of personnel records, established training courses for college graduates and instituted specifications and quality standards. Our power apparatus manufacturing business, located in Chicago, continued to expand and installations of important projects were made, such as those in the Hotel Astor, the Metropolitan Club and Metropolitan Life buildings in New York. Many new distributing houses were also opened.

In 1899 an event occurred which gave you great happiness. That was the year of your marriage to Mary C. Rust whose devotion, charm and companionship brought new inspiration into your life.

In 1902, Mr. Thayer was elected Vice President and in 1903, you authorized the construction of the first buildings of the great Hawthorne Works at Cicero, Illinois. In 1905 the power apparatus shops were moved from Clinton Street to Hawthorne. By this time the country had 4,000,000 telephones. Within a year we became the largest electrical manufacturing and distributing organization in the world, with sales of \$65,000,000 in 1906. That same year you established our Pension System which has not only been of great benefit to thousands of our employees in their retirement

years, but also an important factor in the maintenance of a highly efficient force.

The sudden economic reversals of 1907 brought a financial panic which threatened the nation's banking system and all important industries. There was grave possibility that some telephone companies might have to suspend service.

In that crisis you, Mr. Thayer and Mr. Welles, by brilliant services, saved our Company and helped relieve the strain upon other Bell System units hard hit by local banking difficulties. Mr. Thayer continued to furnish telephone supplies on an extended credit basis; Mr. Welles purchased American currency in Europe and brought it to this country to support our payroll; and you helped to restore confidence by coming to New York and offering New York bankers reimbursement for borrowings in advance of due dates. The American public knows little about these historic facts, but we of Western Electric will always remember them.

Added to the strain of the financial crisis was the demand upon



your counsel during the Vail reorganization of the Bell System in 1907. In that year much of the System's engineering work was consolidated. The Boston laboratories of the American Telephone and Telegraph Company which had become the parent Company of the Bell System in 1900, and Western's engineering units at Clinton Street, Chicago, were moved and consolidated with the Company's engineering group at 463 West Street, under

HARRY B. THAYER

the direction of our Chief Engineer, C. E. Scribner.

To relieve you of the great responsibilities which had overtaxed your strength and undermined your health, Mr. Thayer was elected President in 1908 and you yourself, became Chairman of the Board, retaining your old office at Clinton Street. The nation had well over 6,000,000 telephones and the Hawthorne plant had continued to expand through almost uninterrupted construction of additional buildings. We had carried both the instruments of communication and many other electrical devices to far parts of the world.

In that historic address delivered in 1905 at the Homecoming and Centennial of Jefferson County, New York, where you were the principal guest of honor, you said:

"There is a great world where automobiles and harvesting machines, and telegraphs, and telephones, and electric lights, and subways, and skyscraper buildings, and trusts, and daily newspapers, and Chicago dressed beef are features. Our grandparents saw the beginning of some of these and rejoiced in the promised benefits to posterity. It is a great price to pay for these benefits if they are attained at the cost of that simplicity of life and appreciation of fundamental principles which prevailed before Faraday made his discoveries or before McCormick and Howe made their inventions."

Although at that time you said nothing of radio, trans-oceanic wireless telegraph had been established three years before, and during your lifetime you were to see our organization commence its important research and further development of the De Forest vacuum tube which would enable the conceptions of trans-continental telephony and trans-oceanic radio telephony to become realities ten years later when our engineers first talked from Arlington, Va. to the Eiffel Tower in Paris. In 1909 the increasing growth of our telephone manufacturing business indicated the wisdom of selling our extensive power apparatus manufacturing business to the General Electric Company. Coincident with this sale an agency arrangement for the distribution of General Electric power apparatus by us was consummated.

The World War, which we have since called World War I, started in 1914; the United States began to be involved in diplomatic incidents in 1915. In 1916, the year of your death, the engineers of the Western Electric Company and the American Telephone and Telegraph Company conducted a mobilization test in cooperation with the U. S. Navy establishing a nation-wide network of communications, using telephone, telegraph, radio and telegraph printers to communicate with stations on this continent and ships deployed in adjacent waters. This system was used by the government after we entered the war in April 1917 and one of its off-shoots was the first ship to shore radio telephone equipment made by us and supplied in quantity to the Navy.

The use of airplanes as a military weapon in that war developed a need for means of communication between plane and ground and we produced the first radio telephone equipment for this purpose.



Mr. Thayer became a member of the U. S. Aviation Board. Another important Western Electric contribution to World War I was the production of large quantities of telephone equipment for the various Army cantonments built in many parts of the country. Our British company developed the Nash Fish, a submarine detector for which its inventor, G. Howard Nash, was decorated by the British Government. Total sales of Western Electric

CHARLES G. DUBOIS

equipment to the U. S. Government amounted to \$31,918,000 during that war. We thought that was a record no future emergency would ever cause us to surpass.

When the war ended, November 11, 1918, we again turned to the pursuits of peace. In 1919 we were proud to have Mr. Thayer chosen as President of the American Telephone and Telegraph Company, succeeding Theodore N. Vail. Another of your former lieutenants, Charles G. DuBois, was elected our President.

In 1922 a complete separation was effected between the organizations handling our Bell Telephone business and our electrical supply business. In 1923 we started construction of the great Kearny Works in New Jersey. The first production there in 1925 was telephone cable. That same year, Walter S. Gifford, whom you knew as one of the young men hired at Clinton Street in 1904, was elevated to the Presidency of the American Telephone and Telegraph Company, which position he still holds.

You will remember the crude beginnings of automatic central office equipment and the extensive program conducted by our en-

gineers to improve it. We had installed a semi-mechanical P.B.X. at our West Street shop in 1910. The production of step-by-step dial switching was started for certain classes of cities. In 1915 the Newark Mulberry Street office was cut into service with semi-mechanical panel type switching. Following World War I the Bell System instituted a program of conversion from manual to dial switching which placed a severe burden on our engineering, manufacturing and installation organizations.

Because of the Bell System's continuing rapid growth and the need for immense quantities of telephone apparatus and equipment it became evident that serving the System was a full time job. Consequently, in 1925, we incorporated the Graybar Electric Company, named in honor of you and Elisha Gray, with your old friend, Albert L. Salt, as its President, for the purpose of segregating into a separate company our electrical supply business. In 1928 the common stock of this corporation was sold to its employees, thus making a new departure in large corporation ownership. Western Electric's interest in Graybar was thereafter represented only by preferred stock, the last of which was paid off and retired by Graybar in 1941.

In 1918 our foreign companies had been transferred to a newly organized subsidiary company called the International Western Electric Company. In the year 1925, as an additional step to concentrate our attention on our ever expanding Bell business, we sold the International Western Electric Company to the International Telephone and Telegraph Company, retaining our interest in the Northern Electric Company. The new owners changed the name to International Standard Electric Corporation and the business was carried on under that name, largely staffed by men who had been selected and trained by you and Mr. Welles.

As a measure to further technical progress in communications, the Western Electric engineering department at West Street was incorporated in December 1924 as the Bell Telephone Laboratories. Its ownership was shared equally between the A. T. & T. Company and Western Electric. That young engineer you knew as Mr. Scribner's assistant, Dr. F. B. Jewett, became its first President in 1925. General J. J. Carty, Vice President of the American Telephone & Telegraph Company, in charge of that company's Development and Research Organization, became Chairman of the Board of the Bell Telephone Laboratories.

As an outgrowth of telephone research, Bell Laboratories developed, and we produce l, in 1926, equipment which brought to the world a notable advance in entertainment and education — the first commercially practicable talking motion pictures. The silver screen at last had become articulate and the long titles and printed dialogue disappeared.

The production of step-by-step and panel dial switching for the replacement of manual central office equipment continued. Later a third system, known as crossbar, was developed and placed in production. These complex equipments in a large metropolitan central office can automatically make nearly 2,000 separate switching operations in the short interval between the time a person starts his call and the ringing of the called subscriber's telephone.

The manufacture of these systems and the large demands for our other telephone products made necessary further additions to our Hawthorne and Kearny Works.

In 1926 Mr. DuBois retired as President and was succeeded by Mr. Edgar S. Bloom whom you will remember for his services to A. T. & T. Company in reorganizing mid-western and Pacific Coast telephone companies. Under his Presidency we produced the equipment for the A. T. & T. Company which resulted in the inauguration of commercial trans-Atlantic radio telephone service in 1927. Under Mr. Bloom's guidance we expanded our efforts in the production and installation of dial central office equipment. In 1929 we commenced building a third great manufacturing plant, the Point Breeze Works in Baltimore, Maryland. The United States had never seemed more prosperous and the number of telephones had grown to 20,000,000.

But, as in 1907, economic forces halted the pace of this prosperity. In September 1929, a crisis on the New York Stock Exchange was followed during the next four years by a series of economic and financial upsets, with many bank failures in Europe and in this country. After this dark and trying period we emerged stronger than at any previous time.

About this time the Bell System inaugurated a service whereby circuits were leased to subscribers to connect printing telegraph instruments, now called "teletypewriters", at each end of the line. This service was extended so that any subscriber having such a teletypewriter could be switched to any other subscriber for this new service. To insure an adequate supply of equipment for this purpose we purchased in 1930, and have since continued to operate, the Teletype Corporation in Chicago.

The following year we acquired the Nassau Smelting & Refining Company at Tottenville, New York, in order to handle efficiently the increasing amounts of non-ferrous scrap materials removed from the Bell System plant.

While under Mr. Bloom's leadership we were concentrating on the Bell System's expanding needs and while the Bell Telephone Laboratories and those of other American industries were con-

tributing improvements to human welfare for conditions of peace, a series of ominous events in Europe and Asia revealed that Germany and Japan had secretly adapted modern scientific knowledge to the manufacture of new and terrible instruments of war. Japan invaded Manchuria and set up a puppet government for this old Chinese province under the new name Manchukuo. Italy became a dictatorship under Mussolini, and, with-



EDGAR S. BLOOM

out provocation, invaded Ethiopia and incorporated it into her African empire. Germany, which had become a republic following World War I, chose the totalitarian form of government under the dictatorship of Adolph Hitler.

Germany's airplanes, tanks, guns and submarines were of such quality and quantity, that it was feared she might overrun a large part of the world before peaceful nations could organize effective resistance. Confronted with this situation, our government embarked on a program of national defense.

In June 1939 Western Electric was authorized by our government to proceed with the manufacture of substantial quantities of airplane radio equipments and when, two months later, Germany invaded Poland and unleashed destructive forces such as the world had never known, it was evident that the facilities of our Company were destined to play an important part in the coming world-wide struggle.

At the end of 1939 President Bloom retired under the provisions of our pension plan, and Vice President Clarence G. Stoll was elected President of the Company on January 1, 1940. You will remember that Mr. Stoll's first job was soldering jacks at Clinton Street in 1903 while you were still our chief executive. From then until he became our President, Mr. Stoll had been continuously engaged in the manufacturing end of the business. He had spent most of those intervening years on engineering, production and executive problems. But he also had first-hand knowledge of war. It was he, you will recall, who was Superintendent of our Antwerp plant when World War I began in 1914.

The beginning of Mr. Stoll's administration witnessed alarming developments of World War II. By mid-summer Germany had subjugated most of Europe. The British retreat from the Continent and the fall of France made it clear that Great Britain could not long withstand the German menace without enormous industrial aid.

The United States stepped up its defense program in September 1940 with compulsory military training of men. This program called for a vast national chain of military camps and bases, while at the same time our country determined to become the "Arsenal of Democracy", converting the greater part of its existing industrial facilities to war production and establishing many new plants.

For these military and industrial establishments Western was called upon to provide many new and complex communication

equipments, and during this war period the Company's experienced forces were busily engaged in the manufacture and installation of a great range of emergency and unusual services, including not only telephone equipments for training camps, shipyards and industrial plants, but more elaborate facilities for the Army's mammoth Pentagon building in Washington and new long distance telephone lines throughout the country, and even to Alaska.

You and your old friend Charlie Brady to whom you gave the first assignment of Chief Installer in 1880, would have enjoyed seeing our installers decked out in red underwear and furs, installing and testing repeater stations on the Alaskan Highway.

Meanwhile, men from our manufacturing department scoured the land to find new plant facilities. We needed more manufacturing space, and hundreds of subcontractors to assist us. We were expected to serve as the "pilot" plant for our industry.

Acute shortages of material threatened the country's war production. Western Electric purchasing agents went in search of new sources of raw material supply. We also had to find substitutes for many materials required to permit the Bell System to maintain the nation's vital nerve network of communications, because materials formerly used for this purpose had been commandeered for war use.

On January 1, 1940 the Western Electric family numbered 33,411.

Those men who had volunteered or had been drafted for the armed services had to be replaced, and we foresaw employment of thousands of women for jobs ordinarily done by men to meet government schedules. Since that day in 1873 when you hired Sarah Adlum, women had worked for us, but usually on such lighter jobs as coil winding, assembly, relay adjustment or clerical work. Now they were to do welding, drilling, carpentry, truck driving, even operate the giant cranes used to pick up cable reels and heavy steel. Much other work of a technical nature, such as electrical testing, also had to be done by women. The speedy training of thousands required facilities far beyond those of the largest trade school. Daily the European war picture grew darker, but almost hourly Western Electric's production grew potentially larger as our employee training program became more effective. Our government sales which had been about \$3,500,000 in 1940 climbed toward a 1941 volume of \$41,000,000.

On Sunday morning, December 7, 1941, while Japanese envoys talked of peace to our Secretary of State in Washington, Japanese planes dealt a crushing aerial blow to our Navy at Pearl Harbor. We had no choice but war against Japan; and her principal allies, Germany and Italy, immediately declared war on us.

We shall not burden you with details of how the Japanese blow to our Navy rendered impossible the defense of the Philippine Islands and other insular possessions west of the Hawaiian group. For the first time since the War of 1812 the menace of invasion hung over our continental shores.

The United States had immediate need of an elaborate telephone network for airplane spotting to alert coastal and interior defenses. The telephone companies with our assistance quickly provided this network for home protection.

The battle lines of this world-wide war circled the earth. Fighting fronts were hundreds of miles long in China, more than a thousand miles long in Russia. Most of Europe's coastline was a German-held fortress and Britain fought an army of Germans and Italians in the African deserts. Japan, in addition to her Asiatic conquests, held thousands of islands in the Pacific ocean. It was a war of great distances, a war of island hopping and the ever present danger of surprise.

We and our Allies had to coordinate offensives by air, land, and sea all over the earth. This required communications equipment upon a hitherto undreamed of scale. Because of the speed of the war in which mechanized divisions, airborne troops and amphibious forces in a few hours covered areas which in former wars would have required days and weeks to traverse, instantaneous and constant communications were imperative. Delicate aviation radio transmitters and microphones had to be built to withstand the heat of a desert sun at one moment and the subzero temperatures of the stratosphere in another. Telephones and other instruments had to endure the destructive effects of tropical fungi and in some cases complete immersion in salt water.

Throughout the world the United States and her Allies needed telephones, field switchboards, cable, radio telephone sets for tanks, planes and ships, and other apparatus in enormous quantities.

In 1942 Western Electric answered these needs with production which was reflected in sales to the government of \$309,000,000. In 1943 they reached \$596,000,000. Our total sales, including sales to the Bell System of materials essential to the war activities, amounted to \$557,000,000 in 1942 and \$700,000,000 in 1943.

But delivery of equipment to our Allies involved a second and greater problem. Early in the war the German U-boats were sinking our ships and those of the British at a frightful rate. Great quantities of industrial production were lost in these sinkings. Because of the experience of our Bell Telephone Laboratories in magnetics, acoustics and electronics, they were asked by the government to help in the design and development of new devices to be manufactured by us. This work was eagerly undertaken.

We cannot tell you our full war story now, Mr. Barton, because of military restrictions. It is possible, however, to mention some of our accomplishments.

Up to a recent month we had produced more than 5,000,000 military telephones and 300,000 sound powered telephones for war.

Beginning with our present war effort and up to late fall of this year the men and women of Western Electric (and women now constitute more than half our force) had produced:

55,000 miles of Spiral 4 cable. 14,000,000,000 conductor feet of exchange cable. 4,475,000,000 conductor feet of toll cable. Package "C" carrier equipments with a value of \$19,000,000.

583,827 airplane radio receivers.

414,836 airplane radio transmitters.

33,101 combination airplane receivers and transmitters.

1,247,422 head sets for aviators and tank crews.

1,365,244 microphones.

Large quantities of various types of Radar.

Thousands of teletypewriters including many adapted to radio. 22,116 switchboard positions of 22 varieties. This quantity does not include those furnished telephone companies for installation in the Pentagon Building and in the hundreds of home front military bases and war factories.

Production statistics provide but a partial index to our war business because more than half of it is now the manufacture of secret weapons. However, as some indication of the nature of our collaboration and that of Bell Telephone Laboratories with the government, we are permitted to tell you that on January 1, 1943, there were 92 major war projects on our books. In 50 out of the 92 projects we suggested the devices to the government. In 78 of the projects the Bell Laboratories did the research development. In 79 they furnished the production design, and of all 92 projects we were the manufacturers.

We are also permitted to tell you of the electrical gun director developed by the Bell Telephone Laboratories and manufactured by Western. It is a direct outgrowth of experience gained in acoustic and transmission testing and research. It has been called the electric brain because it makes split-second mathematical computations enabling hitherto unknown accuracy in fire control against targets moving at terrific speeds.

When our German enemies unleashed their terror weapon, the first robot bomb, upon London earlier this year, they soon had damaged more than 800,000 homes and killed or wounded over 18,000 people. Mechanical gun directors and other devices for fire control could not be operated with sufficient speed and precision to prove effective against the 17 foot self-propelled infernal machines which came over Britain at speeds ranging between 350 and 500 miles per hour, easily outdistancing most types of fighter planes.

The concentrated use of the Western Electric Gun Director along the Channel coast where anti-aircraft fire could achieve fullest effect without endangering British defense planes, proved the chief factor in preventing the Germans from annihilating London during that phase of the war. At the height of the robot attacks a United States gun squadron, deployed with British squadrons, shot down 76 per cent of all robots coming within range. This gun director has been acclaimed one of the foremost ordnance contributions of the war.

Most of our present war products stem from the technique and experience acquired through the years, and the gun director had a notable predecessor fifty years ago. The early one which we made is well nigh forgotten, but because of it and on account of our long record of collaboration with the government we are sure that today's electrical gun director will hold unusual interest for you and Mr. Thayer.

Both of you helped build one of the first gun directors ever used. Our old engineering records contain the patent assignments of the Fiske Range Finder, called a "gun director" by the newspapers of the nineties. We have read Admiral Fiske's account of the assistance you and Mr. Thayer gave him. It is an almost startling historical fact that it was built in our New York shop, now the Bell Laboratories, where the first model of the present electric gun director was also built, and that you and Mr. Thayer gave "Lieutenant" Fiske the use of a special laboratory room there for his experiments. Fiske's Range Finder included two telephones and its trial on the U.S.S. Baltimore was the first time a telephone had been installed on board any ship. Now there are telephones on practically all of the 60,000 ships our country has built for war purposes since our war effort began.

Today there are approximately 12,000,000 men and women in the Armed Forces of the United States. More than 25,000 have been drawn from our ranks, and our service flag, we sadly note, contains an ever growing number of gold stars.

We are proud of the fact that the Army and Navy "E" flag, awarded for excellence in production, flies under the national emblem above our three major Works, but we are infinitely prouder of the reason for its award. Our products are helping our fighting forces turn the tide of battle on all the world's fighting fronts. This year's government sales will be over \$750,000,000, an average of more than \$2,000,000 for each day in the year or as

much in two and a half weeks as our total sales to the government during all of World War I. In addition, during 1944 our sales to the Bell System will amount to over \$120,000,000, practically all of which is applicable to the war effort. For the five year period, 1940 to 1944 inclusive, our total sales to the government will amount to more than \$1,700,000,000 which exceeds the Company's total sales to all customers during the first 50 years



CLARENCE G. STOLL

of its existence. We have met schedules which looked humanly impossible to meet. 19 of our 29 distributing houses converted repair shop facilities to assist the three major Works. We have leased 22 satellite plants in 15 cities, and have made subcontracts and other purchase arrangements with nearly 15,000 subcontractors and suppliers. We have now become the world's largest producer of communications and electronic equipment for war.

Indeed we have come a long way in 75 years. Our history has been inseparable from the record and growth of these United States. We doubt that any historian can adequately interpret the full effect of Western Electric's products and pioneer achievements. Should this statement be questioned, the skeptic has but to contemplate the effect of the telephone's use upon the lives of the American people. Today the Bell System contains almost 22,000,-000 telephones, nearly half of all those in the world. Western Electric manufactured nearly all of the Bell instruments now in use.

In this critical 75th year there is still a mighty job to do. But we, together with our associates in the Bell System, now can see the effect of our service to the United States on the home front and in battle, as the vital role of communications equipment determines the margin between victory and defeat.

Yes, Mr. Barton, we have come a long way since that blizzard of 1869 when you and your brother George travelled from Lorraine to Rodman, N. Y., to arrange for the \$500 which helped you buy your interest in the Cleveland shop. That \$500 and the \$400 obtained from the mortgage your mother placed on the family home started this Company whose gross assets today exceed \$500,000,000.

All these resources and the 100,000 members of the Western Electric family are now devoted to the cause which would be your first concern if you were with us.

A great author has written: "Not man alone but everything in the world reveals its true strength when demands are imposed upon it."

That we have been able thus far to meet our country's demands is because you and all who helped you "built a house upon a rock".

With sincere gratitude to you, Sir, to your associates of those early days, and to the thousands who contributed to the Company's welfare before they left our ranks, we remain,

Faithfully yours,

Western Electric Men and Women of 1944.

November 18, 1944.





This building, still standing on St. Clair Street, Cleveland, housed original Gray and Barton shop in 1869. Circle indicates space occupied.



Employees of Gray and Barton about 1871.

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Western Union's old shop at 62-68 New Church Street, New York, became Western Electric Mfg. Co.'s first eastern plant in 1879.



Boston instrument shop where Bell made first telephone. Bought by Western Electric when it entered the Bell System in 1881.



Gilliland Electrical Mfg. Co., Indianapolis, acquired in 1881, as one of W.E.'s manufacturing branches.



Factory in Antwerp, Belgium, opened in 1882.



CRAY & BARTON,

162 SOUTH WATER STREET,

CHICAGO, ILL.,

and

93 ST. CLAIR STREET,

CLEVELAND, OHIO.

MANUFACTURERS OF

ELECTRICAL INSTRUMENTS,

and dealers in

TELEGRAPH SUPPLIES.

Fill promptly all orders for the

STANDARD

TELEGRAPH

INSTRUMENTS,

LINE and

BATTERY

MATERIAL,

And make to order

ALL KINDS OF

ELECTRIC APPARATUS.

E. GRAY.

E. M. BARTON.

This first advertisement of Gray and Barton appeared in the Journal of the Telegraph in 1869.



Elisha Gray's Printer Telegraph.

The Edison Electric Pen, manufactured by W.E. Mfg. Co. in late '70's, was father of the mimeograph. Pen point vibrations perforated a stencil.



World's first commercial typewriter, manufactured by Remington Brothers in 1874. W.E. co-designed it and became first sales agent.



One of the earliest telephones made by Western for the American Bell Company in 1882.

Switchboard made by Western in the '80's with generator treadle.



Mr. Barton's New York shop pass of 1904. Lower right is F. R. Jeschke, age 97, Company's oldest retired employee.



General Conference — January, 1907.

L. to r. top row – G. E. Pingree, G. Swope, J. L. McQuarrie, A. L. Salt, E. S. Keefer, F. V. Bennis. Middle row – E. W. Rockafellow, H. F. Albright, H. M. Sage, M. S. Allen, F. H. Wilkins, P. H. Coolidge, J. W. Johnston. Bottom row – W. R Patterson, C. G. DuBois, E. M. Barton, H. B. Thayer, C. E. Scribner, H. A. Halligan.

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Early in this century, Telephone installers used the "horseless carriage" to deliver W.E. wall sets.

