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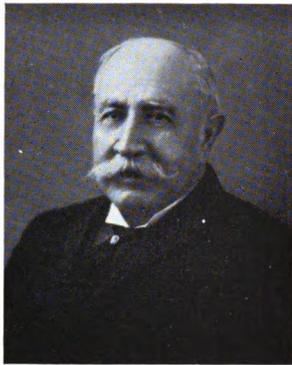
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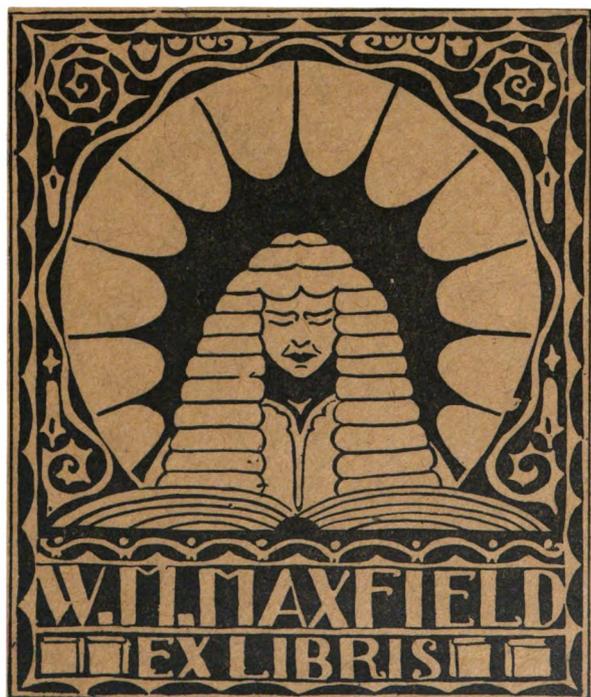
To

Walter S. Martin

With the Compliments

Walter S. Lippert

December 1926



*Of this special edition
Commemorating the Fiftieth Anniversary
of the invention of the Telephone
one thousand numbered copies
have been printed on
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This copy is number 191

THE TELEPHONE IDEA

FIFTY YEARS AFTER

BY
ARTHUR POUND

NEW YORK

GREENBERG, PUBLISHER

1926
L70

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PRINTED IN THE UNITED STATES OF AMERICA

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THE TELEPHONE IDEA

FIFTY YEARS AFTER

I

OF MEN AND MESSAGES

WORDS are most precious freight. Getting the message through is a dramatic task which has stirred the wills and hearts of men since long before the first Marathon runner bore tidings of victory from the battlefield to Athens. The Pony Express and the Fast Mail captured the imagination of America in their days just as the Air Mail has in ours. "Get the mails through"—whenever a disaster interrupts the postal service all step aside in obedience to that dictate. On the façade of the New York City Post Office is carved a sentence from Herodotus' description of the first known postal system: "Neither snow nor rain nor heat nor gloom of night stays these couriers from the swift completion of their appointed rounds." The captain of a sinking liner saves lives first, then the mails, then bullion if he can. Thus the work-a-day world, in the pinches when rock-bottom judgments are reached by unanimous consent, testifies to its faith in words, for what, after all, does a mail sack contain save words, groups and packets of words called letters, pamphlets, newspapers, magazines, books?

We even pay our bills in words, in currency worth no

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more than other paper save for the word of the government stamped thereon and with checks which would be mere scraps of paper except for their identifying words. No bargain can be struck without words; and the bargain is the mainspring of trade, the cement of a trading world. Every contract implies a meeting of the minds; and how can minds meet save through words?

Whoever eases the path of words through space, whoever speeds the transport of words, quickens the circulation of the social organism. A society may grow old and stiff with age; if so, it needs transfusions of idea-carrying words to pulse through its arteries of communication.

If we could "look into the seeds of time and say which grain will grow and which will not," perhaps we would discover that those grains grow which are most clearly understood and described. Alexander Graham Bell, whose life and works earned for him a right to the grandest of all titles—that of seer—had this gift of thinking to the heart of things and reducing truths as yet unrealized to concise, definite language. In 1875 he said: "If I can make a current of electricity vary in intensity, precisely as the air varies in density during the production of a sound, I should be able to transmit speech telegraphically."

This prophecy, this idea never before expressed in language, became fact within the year following its utterance. It was expanded in Bell's application for a patent, to cover, "the method of, and apparatus for, transmitting vocal or other sounds telegraphically, by causing electrical undulations, similar in form to the vibrations

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of the air accompanying the said vocal or other sounds.”

Two years later, when the telephone was still regarded as a toy by the business world, Bell the Seer made this further foray into prophecy, perhaps the most successful leap into the hidden future taken by a modern mind: “It is conceivable that cables of telephone wires could be laid underground or suspended overhead, connecting by branch wires with private dwellings, country houses, shops, manufactories, etc., etc., and also connecting cities and towns and various places throughout the country, I am aware that such ideas may appear to you Utopian and out of place, but, believing as I do that such a scheme will be the ultimate result of the introduction of the telephone to the public, I impress upon you the advisability of keeping this end in view that all present arrangements may be ultimately realized in this grand system.”

This “grand system” is now a reality and a more complete and effective reality than even Bell could vision, since it connects not only “various places throughout the country” but also has leaped the seas to compass telephone conversation between Europe and America. As yet Bell’s prophecy of 1876—“some day, all the people of the United States will sing the Star Spangled Banner in unison by means of the telephone”—remains unaccomplished, but there is nothing to keep it from being done in some coming hour of national exaltation or thanksgiving.

This discovery and countless others which have changed the world flowed from “the scientific use of the imagina-

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tion." Of old the unknowns in the equation of existence wrought chiefly upon the fears of "the brave little biped." Now, since so many of these unknowns have been identified, named, isolated and reproduced, fear yields to an equally strong ambition, desire to understand all life's processes. Among all the ages and sectors of the world, present-day America is notable for the degree to which the people have abandoned opposition to the application of scientific discoveries in everyday affairs.

In this respect we are the inheritors of priceless boons from by-gone legions of pioneers, many of whom remain dim shadows against the background of history. As one surveys the long swing from the Stone Age to the Electrical Age, the conviction grows that unknown benefactors of the human race deserve a memorial. Who was first to reduce the back-breaking toil of man and beast by inventing wheel-and-axle? Who invented the screw, the lever, the pulley, the wedge, the inclined plane? All these were in use before civilization dawned, all had to be in use before civilization could dawn anywhere. Otherwise, so keen is the race between Want and Art in this rough world of ours, no primitive mortal could have gained leisure in which to draw, to refine crude pictures into an alphabet, to chart the constellations in their courses, to originate a system of numbers, to make records for the guidance of posterity—in short, to evolve those mediums of thought-transfer by means of which knowledge spreads from region to region and persists from age to age.

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Just as there could be no continuous stream of thought-development except for words and no leisure except for tools, so there can be no progress without communications. The early, and by comparison static, ages, carry the names of materials—Stone Age, Bronze Age, Iron Age, but to the later, more dynamic eras we give by common consent the names of things that go and forces that move, carrying man and his messages through space—Horse Age, Sail Age, Steam Age, Electrical Age, Automobile Age, Telephone Age.

The common sense verdict embodied in this popular phraseology is everlastingly true. The most significant features of any society are the means by which its individuals sort themselves, their ideas and their resources, into new combinations. Every change in transporting men, goods and thought affects social groupings, social life. Each step in reducing travel-time has broadened mental horizons, expanded trade, created wants and supplied them. Yale College was founded with money made in India by Elihu Yale three-quarters of a century before the American Revolution began. Even then, when swift transport and communications were undreamed of, trade drew the continents together. Emmanuel Kant lived in a little German city all his days, yet his ideas built a turntable for human thought, shifting the trend of philosophy. Truly, when a man can set his words to traveling, the vital part of him has right of way abroad, though he himself sits comfortably at home the while, smoking his pipe. When travel-time for words

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is shortened, all social activities respond to that impetus. This response is the more marked and effective in degree as the new process is cheap, simple and accessible to a population. And when the winged words go their ways exactly as spoken by the sender, with every inflection, modulation and hesitation of speech to help each in understanding the other's meaning, still another barrier has been removed from the path of human understanding, and another advance can be scored, not only in the supplying of material wants, but also in extending and deepening those noble qualities of Man, his judgment and vision, which Shakespeare links with breadth of discourse in his oft-quoted lines:

“Man is a being, holding large discourse,
Looking before and after.”

II

OF BELL AND SMALL BEGINNINGS

FEW indeed of the infinite days that are done meant more to the days which are to come than March 10, 1876, when Alexander Graham Bell's words, "Mr. Watson, come here, I want you," passed through an electrified wire, and were heard and understood by his assistant at the other end. That simple, commonplace message—any message at all transmitted by those means—promised man a new world to live in; a world in which a pair of seven league boots could stand behind the door of every dwelling and office, a world in which work and play could proceed at faster pace than ever before. In the histories of a thousand years hence the Philadelphia Centennial of 1876 may be mentioned chiefly as the place where the telephone first obtained recognition from crowned heads and famous scientists.

I hear some doubter say: "The telegraph." Yes, Morse's telegraph needs consideration; as do many other steps in the evolution of communications. But the telegraph, after all, was and has ever remained a signalling device, youngest of an old family which begins with the beacon flares and smoke signals of uncouth tribes. Among these

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signalling systems were the heliograph, the wig-wag and Napoleon's semaphores, of paramount value once and still highly useful under special conditions. All that the telegraph did was to transmit signals farther than they had ever been transmitted before. It outdid the heliograph and the semaphore in speed and range; yet there still remained the expert tasks of reducing words to dot-and-dash signals at one end of the line and translating those signals back into words at the other end of the line. Telegraphing required even more training than flashing signals by mirror or by semaphore. The telegraph therefore lacked the flexibility of the telephone as a means of communication. It could not be as private as the telephone in one sense or as public as the telephone in another sense. The fact that any normal human being could telephone, after a few moments instruction, dedicated the telephone to the masses beyond all recall: the fact that no one could telegraph until he had mastered an intricate code kept, and still keeps, the telegraph in a limited, though highly useful, field of communications.

The telegraph could bind the country closer in a business way; it could not bind the community closer socially, bring the country doctor to the bedside of his patient, summon a theatre party together on short notice, save trips to the store or ease the anxiety of the mother of a lost child. Bell and Vail could and did predict universal telephone service, heralding a day when no one in the United States need be out of reach of a telephone; but no sane man ever could or did make such a prophecy for the

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telegraph, for the excellent reason that the conditions surrounding its set-up and use preclude a station in every man's house or office.

The telephone, in 1876, was new from every angle. It was a "sport," as a botanist might say, but nevertheless hardy, destined to weather lean years, public neglect and harsh competition. Most patents, said a famous patent lawyer, cover plans for doing in a worse way something that is well done already. This truism never applied to the infant telephone. It did what had never been done before on earth, what could never be done without it. So devastatingly new, so revolutionary, was this innovation of Bell's that a self-satisfied world wasted a good deal of time ridiculing the telephone and its inventor. Supposedly wise men of business refused to accept the free tender of licenses soon to be worth fortunes; the Western Union Telegraph Company refused to pay \$100,000 for patents which a few years later it tried to overturn in the courts at a cost of millions. The success of the telephone was one of the forces that helped to break down the conservatism of that day, and to open the door of opportunity to all manner of innovations.

Looking backward, it is easy to be philosophical regarding the public neglect which greeted the telephone at its birth and the bitter opposition which the pioneers of the telephone had to fight. One can say that the eighties were dull and stupid years full of fat pomposities and varnished gimcracks, an era of mansard roofs, iron deer, horsehair furniture, antimacassars, bustles and

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whiskers. Those were, indeed, some of the characteristics of the decade that made a national hero of P. T. Barnum and tried, without success, to make a national joke out of Alexander Graham Bell. Nevertheless, after due allowance for "other times, other manners," a residue of venom remains on the record which stains indelibly a number of otherwise fair reputations. From the treatment accorded Bell and his associates, from the vicious attacks upon their fairly won and amply proved patents, there is no escaping the conclusion that business morals and commercial decency in the eighties were lower than they are today. Every innovation has to endure ordeal by competition; but there is present in our modern world more of the spirit of fair play in such tests than existed in the early eighties. Many causes have contributed to this elevation of the ethics of trade; a vast amount of cleansing water has gone over the dam of competition in fifty years; we have had our scandals and reforms, our muck-rakers and trust-busters, investigation and legislation aplenty. Likewise we have had the benefit of certain shining examples of foursquare business, in which success has been attained by fair means, and ideals of public service consistently maintained.

Fortunately for the country the five men who nursed the infant telephone along had more than the average share of courage, faith, honesty and persistence. Chance brought them together; yet, considering the unity of the group and its well-rounded character, they could hardly have been better chosen if years of thought had been

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given to the combination. Bell tutored Thomas Sanders' son, and so Sanders, a leather merchant of relatively small means but excellent credit, came in to finance the great experiment. The handsome young inventor, third of his line who had taught the art of speech to the deaf, loved Gardiner G. Hubbard's deaf daughter. Here is one of the most exquisite of American romances awaiting a novelist, a tender love story lasting from youth to age, and proceeding delicately, yet with a rugged faith, from poverty to riches, from ridicule to fame, from insignificance to honors. Consider the youthful professor, on fire with success, rushing out of Williams' garret to tell his triumph in the art of speech to one who could hear no word of his proud communication. A subtler language, that of lip-reading, conveyed the epochal message to that constant heart of Mabel Hubbard. Be sure that smiles and laughter, perhaps also of joy and of hope long deferred, helped the lover and his lass to bridge the gulf of silence that happy day. Bell, then as always, was ardent in everything—a perfect example of the artist-inventor type. Truly here is no wooden, statuesque hero, but instead a man of temperament, tuned to suffer greatly and rejoice greatly, trusting, unselfish, unspoiled. All his life he was a giver rather than a taker, a "yes man" rather than a "no man." Immediately upon receipt of his first certificate of stock in the parent Bell Company, he straightway endorsed it over to his wife. The telephone, in a sense, was merely an episode in his life, a way-station on a trunk-line. Bell was trying to make the deaf hear before he invented

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the telephone and he kept on trying to make the deaf hear long after he passed, as a creative influence, from the telephone scene. No man knew better than Alexander Graham Bell the possibilities of the telephone as a business; others could give the telephone what it needed; while no one else appeared able to do for those deprived of hearing all that he thought he could do for them.

Bell, Sanders, and Hubbard each owned three-tenths of the original Bell telephone patents; Watson one-tenth. Never was an inventor and a visionary more fortunate in his business associates. The docket of patent law history is not without cases in which inventors have been euchred out of fame and wealth by more practical or intriguing minds. No such unworthy heritage hangs over the history of the telephone; instead, from the first moment of association, each of the original telephone pioneers stood ready to risk everything in order to make the telephone "go."

But they could not, try as they would, make it go without help. Bell's genius was unsuited to business. Though his father-in-law could hardly have been excelled as the enthusiastic promoter of his new idea, Mr. Hubbard knew that the tiller of the telephone business required a younger, steadier hand than his. Mr. Sanders' worries in financing the enterprise had brought him close to the breaking point. Mr. Watson's talents were mechanical; though he later developed into a successful executive, he was then too young to take on the tremendous task of organizing a national system of communications. The Bell group began its hunt for a leader.

III

OF PERSONS AND POLICIES

MANY young businesses with fair prospects founder within sight of the promised shore simply because they lack capital. In this case the normal needs of a new business were intensified by factors peculiar to the telephone. A wise policy, adhered to from the beginning, dictated that telephones should be leased, not sold. The cost of the instruments swallowed up rentals far in advance; the more the business of the company grew the more capital it required. For lack of such resources bankruptcy threatened.

That crisis passed, but the need for finding capital with which to extend telephone service has continued to this day and presumably will continue with the growth of the population of the United States in number and with the intensity of its desire for quick communication. A business which calls for heavy capital outlay for poles, wire, conduits, switchboards and instruments, must ever find new money in degree as it expands and improves its service.

However, the public, in certain times and areas, is inclined to look at some of the impressive figures in annual

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telephone statements without considering the equally impressive long-range responsibilities. Sometimes there are local demands for low rates which, in the long run, would tend to curtail telephone service and extensions in that locality and so handicap it in industrial competition with the rest of the country.

First to last, the telephone business in the United States has been built up with an unusual degree of regard for public service as contrasted with private gain. There are no telephone fortunes in America, to match the personal and family accumulations that have resulted from other industrial developments—in railroading, coal and metal mining, lumbering, textile, steel and automobiles. We read of Oil Kings, Railroad Kings, and Cattle Kings, but never of Telephone Kings. No one, it has been said without contradiction, has ever made as much as a million dollars out of the telephone, and no one is ever likely to, since telephone stock ownership is now widely diffused.

The stability of the telephone structure today is in striking contrast to the difficulties of fifty years ago. In 1878 four men possessed a most serviceable invention peculiarly suited to American needs, yet they could not market it fast enough to avoid bankruptcy. A new means of communication, of the utmost social significance to this expansive country and to civilization at large, was going begging, looking for a man to save it. How it should develop depended in large measure upon that man, upon his bigness, vision and idealism. He might save the telephone business and still only half realize its possibilities.

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He might save it for himself and his heirs, in which case the telephone business was certain later to run afoul of the gathering public demand for regulation of public utilities. He might borrow enough to tide over the crisis and then retrench to keep sole control of a business which, for the country's good, ought to keep growing to the full limit of its ability to serve society. He might avoid being crushed by competition only to crush competition when he had gained enough power to do so. He might have viewed the telephone as a milch cow for the production of private profits, and the nation simply as a source of revenue. He might have been a money grubber, or a financial buccaneer, or a cold, offish person with small sense of public responsibility. Given a leader of any one of those types, this young, weak business was certain to take on the color of his personality, and as such it would have come inevitably into serious conflict with its customers and public authority.

Fortunately Hubbard introduced a business statesman into the telephone situation at this critical stage. Theodore N. Vail was a New Jersey boy, whose uncle had been Samuel F. B. Morse's partner in bringing out the telegraph. The glamour, the challenge, of communications had crept into his blood early. Always adventurous, he went West, became a telegraph operator on the frontier and then switched to the Railway Mail Service. Energy, ability to handle men, and the knack of systematizing work, pushed him ahead until at thirty-three he was Superintendent of the Railway Mail Service at Wash-

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ington, with a proud record of achievement behind him, including the creation of the **Fast Mail**.

Observe how well Vail's character and experience fitted into the needs of the infant telephone business. He had "wire" in his blood, and the passion for getting the message through. He saw this magnificent country as a whole; West or East, the frontier spirit clung. He understood the American people and their reactions to speed. He had dealt with them over the counter of a lonely plains telegraph station; from a desk in the national capital he had handled their complaints when the mails went wrong. His friends were scattered far and wide; from the day he took office as General Manager of the original Bell Company he could count on the help of hundreds of vigorous men in all parts of the country. His postal service had given him the public point of view, and also had endowed him with a horror for government red tape, of which his enterprising spirit had been the victim many times. Finally, Vail was a sanguine man, with infinite faith in human progress.

The close corporation became a broader corporation, including stockholders of acknowledged financial strength. Then Vail took up the fight for the Bell patents. Victory in this litigation guaranteed that the telephone business would be developed on its own merits, not as a feeder for the telegraph. Later Vail coined the slogan "One policy, one system and universal service;" but from the very start of his telephone career he was working toward a unified, national system. His successful defense of the

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Bell patents in the courts had cleared the ground for expansion. He introduced a standard five year contract which required local companies using Bell instruments to build exchanges to serve definitely restricted areas. Another contract provided for connections between two or more towns. Vail and his colleagues never doubted the coming of long distance telephony, even though at that time local conversations were often difficult because the best installations available were imperfect, and added to them were induction troubles and weather disturbances. Schooled to the national point of view on communications, Vail's mind leaped beyond these obstacles; he made provision for linking towns and states together long in advance of the possibility of connecting them. In his mind he already saw all the American States bound together by a national system of vocal communication in which the Bell Company would be a permanent partner, while local companies met local needs, a business as broad as the Union and like the Union federalized. Local self-government would obtain in local and sectional affairs, while the central company performed those functions which were of common benefit to all sections, welding the whole into a national system of communications constantly improving in effectiveness.

To accomplish nation-wide service as fully and economically as possible required physical connections and joint operating agreements between and among a large number of telephone companies. Multiple telephone systems involved useless multiplication of expensive equip-

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ments and payrolls. Two telephone companies operating in a community meant two separate communication circles, each too small to render the utmost in telephone service to subscribers. Neither list represented fully the community; no one could reach the whole community, via telephone, unless he paid double rentals and tolls. Though competition proved expensive to all concerned, yet the ideal of a single, national telephone service could not be achieved without a degree of unified control verging on monopoly. To offset public criticism on that score, the companies accepted in general the principle of government regulation of rates. At the same time it was recognized that operating unity did not necessarily imply unity of ownership. The nation had a stake in universal service at reasonable rates; but it did not have equal interest in the details of ownership. As long as lines were connected to the extent of establishing national communications on a broad, stable basis without expensive duplication, ownership of any particular stretch of line was of minor importance from the public standpoint. Consequently, voluntary cooperation has diminished duplication and established a national communications system without interfering with local operations, initiative or ownership. While this system is not yet completed, there are relatively few independent companies which have not yet tied their lines physically into the Bell System network which makes long distance communication possible over wide areas and renders communication practically co-extensive with the United States.

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The principle of public regulation of public utilities is no longer debated, but it is to the credit of the telephone business that it accepted such regulation early and willingly. Theodore N. Vail's statements on that theme formulated the policy that it was his company's duty to furnish service at the lowest practical rates, the necessities of sound finance, steady expansion and progressive improvement being taken into account by rate-reviewing bodies. At a moment when his course influenced many business leaders, and particularly the executives of telephone companies, he put on record his company's unhesitating acceptance of the status of a regulated utility, whose rates would always be open to review by competent State or Federal authorities. These far-sighted judgments, as time went on, became part of the unwritten constitution of the telephone industry. The latest expression of this policy is stated by President Walter S. Gifford* of the American Telephone and Telegraph Company.

These policies were laid down, be it noted, in the infant days of the telephone industry. Some of them, no doubt, sounded preposterous to conservative men in other fields; yet to the growing group of telephone pioneers, optimists all, Vail's picture of continuous service over the whole country did not seem overdrawn. Step

*NOTE: Annual report for 1926 submitted to the Stockholders of the American Telephone and Telegraph Company on March 3, 1926. "We have always welcomed regulation by public authorities and we recognize that, not only our stockholders, but the public generally, are entitled to know how we are carrying on our stewardship. . . . It is our further purpose to conduct the affairs of the Bell System in accordance with American ideals and traditions, so that it may continue to merit the confidence of the people of the country."

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by step, with a perseverance that marked the group as one of the most effective body of co-workers ever assembled, mechanical and administrative difficulties were overcome.

Precisely how and by whom these technical advances were made is of record elsewhere; for the purposes of this sketch it is perhaps enough to say that telephoning, once a matter of nerve strain and lung power, has become progressively easier and more certain. Connections are quickly established, disagreeable noises have been eliminated, service proceeds with few hitches at any point. One has but to compare the quality of long distance telephony twenty years ago and today to realize the staggering amount of intensive work which has gone into perfecting the telephone art and multiplying its contacts with the people.

IV

OF UNITY AND UNION

WHEN transatlantic telephone communication was demonstrated, newspapers hailed the feat as a triumph approaching the miraculous. But the real triumph, the miracle which we forget to acknowledge because it has become an everyday occurrence, lies in the fact that at any hour of the day or night any American who has access to a telephone can call practically any other resident of the United States within telephone reach, in reasonable assurance that his call will be completed as promptly as circumstances permit. Within minutes the Atlantic seaboard can be put into voice-to-voice touch with the Pacific seaboard.

Lewis and Clark, racing against time in order to claim the Oregon coast for the young Republic, required eighteen months to travel from St. Louis to the mouth of the Columbia in 1803-04. As late as 1852, Granville Stuart, whose "Forty Years on the Frontier" has just been published, spent six months covering the trail from Iowa to Sacramento. Stuart's diary contains this picture of the Pony Express, which established a new transcontinental record in March, 1861, by carrying the first inaugural

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address of President Lincoln through to Sacramento from the rail head at St. Joseph, Missouri, in seven days and seventeen hours. "Through rain and snow, across rivers, deserts and mountain ranges, in the darkest nights pursued by Indians or robbers; often finding their relief murdered, the station burned and horses driven off, they kept right on . . . and it never occurred to one of the riders that any obstacle, no matter what it was, was great enough to delay them one minute."

In fruitful succession came the transcontinental railways, ocean cables, the Fast Mail of the seventies, the linking of New York and San Francisco by telephone, and the air mail. "Long lines" connecting the Atlantic and Pacific seaboard by telephone were formally opened on January 25, 1915, on which memorable occasion Alexander Graham Bell in New York talked to his first assistant in telephony, Thomas A. Watson, at San Francisco. After thirty-nine years of telephone history, Bell in New York could say to Watson in San Francisco, just as he had said once before when three rooms separated them in Boston, "Mr. Watson, come here; I want you." But this time a continent stretched between the two veterans of the great experiment of 1876, and Watson could but reply: "It would take a week for me to do that now." A week, I grant you, is not too much for the spanning of a continent; yet dismally slow seems the fastest train compared to the rate of 56,000 miles per second at which speech can now travel from one border of the United States to the other. For purposes of thought

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transmission this vast country has been compressed into a fraction of its former size.

There is a wealth of practical political philosophy in this quotation from a speech made at the opening of long distance communication between the Atlantic and Pacific:

This is a final blow to sectionalism—it has put a seal on the fact that there is no longer East and West, North and South. Not even the railroads or the Panama Canal have done or can do so much toward bringing the States closer together and uniting them more firmly, not only in commerce but in thought and language. Provincialism will become rarer and rarer, localism, dialects—all such things that depend on isolation—are getting to be an impossibility in the United States, and the telephone has been the greatest agent in bringing about this condition. It is hard for people to get very far apart when they are in such constant touch with each other. I believe quite firmly that, had the telephone system reached its present perfection previous to 1861, the Civil War would not have occurred. The wires would not have let the North and South drift so far apart.

This cohesive force, it remains to be said, has not cost the United States Government or any of its political subdivisions, one penny. Other nations, needing the telephone less on the score of national expanse, have spent millions in establishing and operating telephone systems inferior to that of America in extent and service. Transcontinental railroads received huge land grants;

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transcontinental telephone lines rose without government aid. In order to give postal facilities to all sections of the United States, whereby the citizens of the United States may appreciate their national unity through a common and inexpensive service, Congress regularly appropriates funds to meet deficits of the Post Office Department. I do not criticize this use of public funds; on the contrary there is a good deal to be said in favor of giving all citizens of the United States a chance to appreciate their unity and interdependence through prompt and far reaching distribution of printed and written words. Nevertheless, the telephone's triumph, the communication of the spoken word on a national scale, which is also beyond price in a political and social sense as an antidote for sectionalism and an invigorator of trade, has been achieved and is being daily extended without cost to any public agency, without the slightest drain upon taxes. On the contrary the telephone is one of the greatest taxpayers in the United States. Eight cents of every telephone dollar goes into public treasuries as taxes.

The United States and its political subdivisions, however, gave the telephone pioneers the opportunity to do a big business in communications. Though that opportunity was as broad as the continent yet the telephone had to be marketed by private capital and the desperately hard work of private citizens. In an open field which contained no favorites in the eye of government, the telephone made its way in the time honored

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American fashion through private enterprise. Later as a single telephone service commended itself more and more to common sense, public regulation of rates established a balance between the interests of the sellers and buyers of telephone service. The result is a triumph for the American way of creating social assets from individual initiative and voluntary cooperation.

During the war the American system of telephone demonstrated its excellence on European soil and also developed, through research and experiment, a long list of special devices needed by the Army and Navy to meet new conditions of warfare.

V

OF FARMS AND HOMESTEADS

IF ONE were to survey mid-Europe and mid-America from an airplane, he would note a fundamental difference writ large on the face of Mother Earth. Over Europe he would see the smokes that spell the presence of hearths and homes rising and intertwining from dwellings clustered in little hamlets. Around these hamlets the land is cut into small strips and slices, irregularly shaped fields grouped around the settlement, or else narrow ribbon-like fields fronting on a highway along which farmhouses stand close together. There live the farm laborers and many of the farm owners of the neighborhood; theirs is an ancient community with an unbroken history older than that of market town or industrial city. From time immemorial their village has had its church and inn, its folk dances and festivals, its traditions and customs of common work, play and worship. In fertile areas one of these humble but enduring little communities appears every two or three miles, a spacing dictated by the fact that no farm laborer should be further from his task than a plow-horse can walk between dawn and the drying of the dew.

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But the drivers of the coast-to-coast mail planes see another sort of social vista as they fly over the prairies of mid-America and the uplands of the Rocky Mountain plateau. Communities are further apart, and between them curl scattered smokes from isolated chimneys. Roads run straight as taut strings mile after mile, crossing each other at right angles. The fields are large rectangles; the farms five to ten times as large as those of Europe. And on each farm is a family living by itself the entire working day, separated from neighbors by distances ranging from a quarter of a mile in truck growing regions to four and five miles in the dry farming regions of the Rocky Mountain States. Five farm families to the square mile is the average for rural America, with the Northwest, the Mountain and Pacific states far below this average.

This "scatteration" is a fundamental fact in American farm life. The government engineers who plotted the basin of the Mississippi and its tributaries into square townships and sections mapped a social problem for America at the same time as they mapped the land. Once the homestead boundaries were fixed, settlers soon followed; both government and settlers left the location of towns, cities and communities to chance. The latter developed as trading centers for farmers. While French and German farmers, and likewise English farm laborers, live in villages all their days, the American farmer rarely takes up residence in a village until he quits farming for good. As long as he remains active, his chief need of a

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town is as a place in which to buy and sell. Thus the general spacing of American villages was determined more or less by the distance of a team of horses can travel in a day, with reasonable allowance for trading time between arrival in town and departure for home. These communities are closer together in the East than in the West; the spacing grows wider as one rides to the setting sun. From ten to fifteen miles is probably a fair average for the nation. While the horse remained the chief motive power, it is obvious that villages so widely scattered could hardly serve as true social centers for the surrounding countryside. Indeed, the "scatteration" of American farmers, then beyond correction by quick transport and communications, made it impossible to concentrate even as important a group function as education in American villages. School districts of relatively small areas and population were early formed to support the little red and white school houses which still dot the countryside.

Churches, as well as schools, are not easily maintained on high standards amid a sparse population. Even more difficult to keep going is the social life of recreation after toil—informal visiting, entertainments, culture clubs, music. To a much greater extent than is generally recognized, the drift from the farms has been a woman's movement, inspired by loneliness and a legitimate desire for a broader life for herself and better educational facilities for the children.

Since distance is the kernel of the social problem of the

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countryside its solvent is improved communication. In the past thirty or forty years fortunately, many distance-reducers and isolation-smashers have become available to country users—rural mail, daily newspapers, circulating libraries, good roads, automobiles, the telephone, radio. Of these perhaps the most effective has been the telephone, since its rapid extension brought it into the farm home in the van of the campaign against isolation. In numberless farm homes the telephone was the first concrete evidence of the service which science and business organization, working together, could render the agricultural population. And to this day the telephone in the farm dwelling remains its most dependable means of communication, since the telephone keeps on functioning when even the best of good roads is impassable for the best of automobiles.

Farmers installed, and are still installing, telephones for excellent business reasons—to save time and money, to get and give information which will help them to produce and market their goods to advantage. In dealing with city commission merchant and village store, in getting railroad cars for crop shipments and repairs for machinery, in summoning professional or neighborly help to meet the unforeseen crises that are always arising in a business which must meet two of life's great contrarities—the weather and the vagaries of animals—the telephone is the farmer's first aid. Also it is the organizer's first line of attack when he sets out to break down the farmer's traditional desire to go his own gait;

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whether the goal be a rural cooperative or a church supper, the promoters use the telephone to "get things started." Into the whole fabric of rural economy, the telephone has worked its way on its merits, until its use now conditions in some degree practically all farm operations. Farmers have long been in the habit of getting advance weather reports by telephone, and now they are giving serious heed to the broadcast advices of agricultural experts on seed, tillage, fertilizers, produce prices and market prospects.

Yet I doubt if the economic importance of the telephone to rural America is as important as its contribution to the social life of the countryside. To the woman of the home it offered a providential escape from loneliness and a heightened sense of security against the hazards of fire, flood, sickness and accidents. This process of rescue and relief, far from having stopped, is still going forward in full vigor; every year sees more farms tied into the national communicating system.

One of my neighbors, on a back road which last winter was sealed tight with snowdrifts for two months, said: "It was heavenly to have the telephone. Talking to folks is the next thing to seeing them." Thus she paid tribute to that wonderfully personal element which gives the telephone its unique force as an invigorator of our social life, its power to transmit the human voice, the best possible substitute for the personal presence. Although radio advances the telephone art as a disseminator of cultural information and entertainment, it can hardly

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take first place in the affections of country people away from the older method of personal communication. The vibrations of the telephone are, fundamentally, the vibrations of hearts, souls and minds of its users, and its entry into the farm house releases emotions long repressed by circumstances. If it is true, as psychologists say, that we value things in proportion as they help us to express our personalities, the telephone is the best-loved mechanism on the modern farm. And that, as millions of farm women will testify, is the fact.

As barriers separating farm homes are being beaten down by new means of speeding travel and ideas, the country using these aids to the fullest extent can escape practically all the disadvantages of "scatteration," while preserving its benefits. As the new forces and mechanisms are more and more utilized, quickening influences will pour into the whole wide range of rural interest, reviving old institutions, building new ones, stimulating the district school and the country church, expanding the scope of farmers' clubs, enlivening country recreation for youth and satisfying the cultural longings of the farm wife and her daughters. Between the extremes of dependence and independence, a happy mean, interdependence, is now attainable, since the isolated farm home has been joined to its fellows by good roads, quick transport and communication rapid beyond the dreams of the most optimistic pioneer.

VI

OF CITIES AND CABLES

IN THE gay nineties city streets were forested with telephone poles and city vistas spoiled by myriads of overhead wires. The city beautiful idea could make precious little headway until the telephone found another medium than the air for urban traffic. After years of experimenting, the telephone went underground, as Bell had prophesied, with such success that today the man on the street sees almost no visual evidence of the all-embracing system of communications which ties all the neighborhoods of his city together and links them to the country in conversational embrace.

Lead-sheathed cables lie in conduits under city streets. The largest of these, as thick as a strong man's wrist, contains 2,400 copper wires constituting 1,200 complete circuits. Twelve hundred persons at one end of such a cable and 1,200 at the other end can talk to each other through it without the slightest confusion. The identity of each of those 1,200 conversations is preserved as inviolate as if each of them took place in a separate Sahara. There are no leaks from one circuit to another, though the insulation between them may be no thicker than a

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pin. Such a cable, with 1,200 individuals at either end, offers more than 1,400,000 possible conversational combinations, yet switchboard operations so sort the traffic that wrong connections are relatively few. In general, the ever-changing stream of talk flows on without a hitch through this hidden nervous system of the city.

If one could tag the fleeting message which pour unceasingly through such a cable, and into the dwellings, offices and stores by means of smaller cables branching from it, if one could portray graphically the beginnings and ends of those conversational currents, he could give us the best possible cross-section of our communicating civilization in action. There one would find every sort and shade of human motive, mood and interest. The listener would hear strange tongues, odd dialects and baffling trade terms. All manner of deals would be in the making, from those involving millions down to purchases by the ounce at the delicatessen. Human beings used to go to market-places to buy and sell; now they can send their voices instead. Men are chasing both dollars and dreams down that narrow cable in the dark of earth; man and maid are courting there cheek by jowl with the chatter of old cronies; news of birth travels on one circuit and news of death on the next; justice trails crime and duty plods toward its deserved successes along that narrow avenue of sound. All manner of movements, programs, plans are being pushed through these myriad leaden channels and their copper wires. There, compressed as nowhere else, life rushes past at top speed in all its colorful complexity.

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If that traffic could be made visible, he who watched it for an hour would see, amid all this variety, two dominant currents, one economic, the other social. In the former the voices marshal and distribute labor, money and materials with which to keep the city going with food, shelter, services, jobs, payrolls, orders, sales. Could these necessities be provided if communications were more difficult? Perhaps; but on an emergency basis at greatly increased cost. The economic life of every great city is keyed to its communications, and most closely keyed to the thought-streams which move endlessly backward and forward under its streets.

The other current which would meet the eye, if the invisible traffic of the telephone could be seen, is social. City dwellers play as well as work; they want food for mind as well as for body; they crave entertainment no less than wages. Through these buried channels of communication they pick up the strands of social life, arrange their evenings, sift themselves out of work-groups into play-groups, secure companions for dinner and the theatre, plan their week-end outings. Across "a wilderness of human flesh," as a poet describes the largest of our cities, soul calls to soul by telephone.

Rightly enough sociologists set great store by breadth of social choice. They think that marriages will be happier and friendships deeper if the individual has opportunity to move in a large rather than a narrow social circle. Talent which may pass almost unnoticed in a small group often attracts attention and wins encouragement

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in a large group. Wherever placed, a telephone has this effect; it widens social choice. No individual with a telephone at his elbow and acquaintances elsewhere needs to remain utterly dependent for company or inspiration upon those immediately around him. In a city this is so profoundly true that one need not even know those who live above, below and alongside of him. His neighbors—or at least those who stand to him in the friendly, mutually helpful relation which neighbors occupy to one another in the country—may be scattered over twenty square miles of crowded terrain. No matter; with the telephone he can quickly sort them out and arrange to bring them together. Though congenial souls may reside in a half dozen suburbs and a dozen widely separated streets, they need never stay out of touch with one another for any length of time. The telephone is the social cord from which their group life depends; except for the telephone they would live, perforce, less abundantly and less joyfully.

Consider the chaos which would descend upon a metropolis if the telephone system should be suddenly thrown into disorder, if all these myriad messages passing through this underground maze of cables should be cut at once. The actors in this conversational drama of city life would try to get the more important messages through in person or by messenger, substituting slow muscle for the swift leap of electricity. Streets and elevators would be choked by the sudden onset of this unusual traffic. Each hour of the day would become a

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rush hour, elevated and subway service would be congested to the point of breakdown. It is doubtful if there would be enough machines of transportation to take up the load thrust upon them by the failure of communication machines to operate, and this shortage would be complicated by the difficulty of dispatching subway and elevated trains, street cars and buses now regularly sent on their several ways by telephone orders. All the delicately adjusted systems of trade and supply would be jolted into inefficiency; deliveries would become uncertain, stocks grow short; the market-places would oscillate between frenzy and apathy. Like a chicken which has just lost its head, the city would flutter wildly at first and then sink toward coma. If the telephone tie-up continued indefinitely, the stricken city would begin to lose population, with skyscrapers and the outskirts suffering the heaviest loss of tenants.

But the most severe blow of all would fall on the city's rescue services. One of the great advantages which a city enjoys over the open country, is the speed with which the city mobilizes trained forces instantly an emergency call of any sort is sounded. In town there is always a policeman available on call and back of him are ranged whole platoons of disciplined peace officers, with arms, gas bombs, motor cars, ready to hurl themselves into any breach of the peace, and to cope with every variety of disaster. Disciplined fire companies, with superb equipment, wait in their stations for the call to action. The telephone is the quick convenient way to bring these

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forces to the rescue on the run, though both fire and police organizations have other electrical signaling systems as well. But medical and hospital service is dependent entirely on the telephone for quick communication. Imagine the shock to a city's nerves if it should awake one morning to find that no doctor could be sought by telephone, if no ambulance could be summoned by telephone to remove the victims of a street accident or train wreck, if no hospital beds could be reserved and no nurses engaged by telephone for the comfort of a sick child or expectant mother.

Literally telephone service is a life-and-death matter to the citizens of every urban community in America. No social survey of any community can be considered complete until it has weighed the communications services of that community. Yet such social surveys are frequently made without mentioning communications. Why? Because good communications are taken for granted in a nation which possesses standardized and universal telephone service. Like the life-giving water in the well that is not missed until it goes dry, telephone traffic flows on under city streets and the public which participates therein gives little heed to the process which sets the pace for, and safeguards the existence of, the whole community.

VII

OF MILLS AND MARKETS

WE HAVE seen, each with his or her own eyes, but perhaps without reflecting upon its social consequences, the growth of quick communication through some part of the fifty years since Bell invented the telephone. We have witnessed this country of magnificent distances gradually binding itself together, dwelling with dwelling, town with country, village with city, across the whole area served by the exchanges and long lines of the connected companies. We who are still young have beheld millions of farm families emerge from isolation, the tucked away mountain hamlet and prairie village brought into touch with the busy currents of trade and social intercourse. Many new tools and systems originated by science and organized by business have contributed to this result; but the telephone has done as much as any other factor to make America strong and united; and, what is even more important, to make America aware of her strength and unity. One can note this tying-in of interests and sentiments in almost any corner of the vast panorama of America.

The countryside where I live, one of the first areas colonized, is dotted thickly with small villages and ham-

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lets. Once they had no communications swifter than horse and foot; now, each is in continuous touch with the other and with the metropolis of the district. Each used to be self-sufficient, a Jack-of-all-Trades village, where practically all the necessities of life were made in crude, laborious ways by men and women held there by the sheer difficulty of getting away. Now, over this whole district, labor is fluid; village carpenters and mechanics follow their jobs over a wide range and motor home at night. Men come from the cities to work in the villages, and from the villages to work in the city. The result, economically, is a more efficient distribution of labor power, less unemployment, greater wealth production. City delivery wagons frequent country roads; the merchandising of many essentials of village and rural life proceeds from a center, with many incidental economies and satisfactions. If the villages tend to become satellites of the cities in the process, I can see no possible harm in that great enough to offset the compensating advantages. Both cities and villages are of value only as they provide shelter and opportunity for human beings, and if the inhabitants of both win through the setting up of closer relationships, why quibble over local jealousies? If the villages lose trade in certain lines to the city, they gain in other lines, through the expanding wants of the old settlers and the advent of new residents. The functions of both city and countryside, of villages and farms change somewhat in this readjustment; but the net result seems to me economically and socially good. In esti-

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mating these trends fairly, we must put littleness from our minds and consider, instead, the well-being of the masses and the general effectiveness of the nation.

Not the least of the telephone's influence on our times has been to give managers wider scope for their undertakings. Just as the huge modern office building, with tens of thousands of occupants by day and only scores of occupants at night, or the equally imposing modern apartment house which gains population while the office building is losing it, would be impossible places for work or residence without telephone service, so it is difficult to picture a large industrial enterprise of the present functioning without means of vocal communication.

In New York City sits the president of a corporation engaged in making quantities of highly intricate goods, perhaps the most intricate goods manufactured in quantity and distributed to the general public—automobiles. The long lines system puts his desk on Broadway into prompt communication with the company's plants in a dozen states. He can talk to a factory manager in Michigan as easily as he can talk to his secretary in the next room. If he desires to talk directly to any foreman in company employ, the connection can be established during the time I have been writing this paragraph; thousands of telephone stations, in hundreds of separate buildings, are at the disposal of this executive. His personal touch carries, in the twinkling of an eye, across tremendous areas; he can gather information, give orders and hold others responsible man to man, voice to voice.

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And this corporation's entire telephone equipment, of course, is interconnected, so that any plant can talk directly with any other plant, and within each plant every key man has a telephone at his elbow. Back and forth across this corporate web fly endlessly the messages which direct capital and labor in the production and marketing of automobiles. Furthermore, this web of corporate communications is tied into a far greater whole; the corporation can reach out, as it were, almost instantly, to its banks, agents, dealers, supply firms and customers. Probably this executive soon will be talking in the same easy fashion to his London agents.

A single unit in this vast manufacturing system may comprise a hundred buildings scattered over two hundred acres. It would take a week to explore the area thoroughly on foot. Communicating the information necessary to effective production in such a plant would be immensely more difficult if the telephone were crossed off the slate. Other systems of interplant and interoffice communication could be arranged, no doubt, but none of them would combine the telephone's speed with the telephone's simplicity of operation, whereby every employee becomes, or at least can become at need, part of the communication's circle. From the standpoint of works management, the telephone has become indispensable to a degree that suggests that industrial expansion to the present extent, if it could have come about at all without the telephone, would have resulted in plant arrangements far different than those existing today. In that case

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street layouts, street car lines and city maps, the geographical settings which condition millions of lives, would be quite otherwise than they are.

One reason big business is big is because modern communications permit growth. The keen, aggressive manager can extend his control of men and things further than his predecessors could. Business enterprises expand as improved communications broaden the market into which trade may be effectively pushed.

Another reason big business is big is because consumers are becoming more alike in their tastes, and hence buy standardized goods in larger quantities. Advertising hastens this standardization of wants, but even without advertising there would be a general drift in that direction, owing to the tendency of a nation with free trade, rapid transport and quick communications to slough off its sectional peculiarities and to reduce itself to a more distinct national type. In this process the telephone, along with many other factors, plays its part. The telephone stimulates trade by making buying and selling more convenient; in addition, it furnishes a medium for an incalculable but staggeringly large amount of mouth-to-mouth advertising, assuredly the most effective of all want-stimulants.

All business, big and little, uses the telephone to good purpose. Day after day for many years Bell's invention has been saving the time of more and more millions. The tremendous growth in the national wealth, which has been a striking feature of the last half century, could not

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have occurred if processes had remained stationary. Wages have been raised, hours shortened, and the standard of living raised because many time saving systems and machines made those advances economically possible. The most extensive free trade area on earth, equipped with a network of superior communications, has been buying the output of plants constantly improving in efficiency—result, a trade so vast and an increase in wealth so prodigious that Europeans accustomed to another scale of values stand astonished at our statistics of production and consumption.

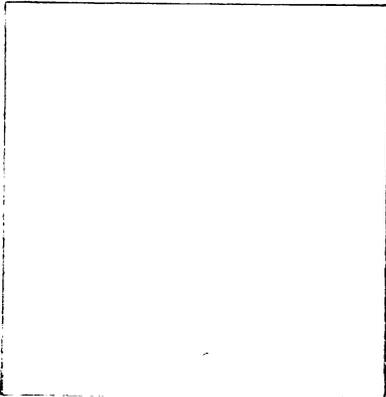
There remains to be considered the fact that communications have leaped ahead so swiftly that a comfortable margin of safety now exists between practice and possibility. American business has not reached, or even approached, the economic limits of safety, when all the new factors in communications are considered. The United States is, indeed, a land of ample margins in coal, food and natural resources of many sorts, but the available margin in communications is wider still, thanks to the alertness of communications engineers and the taut efficiency of communications organizations.

American telephone methods, transplanted to France in 1917, achieved remarkable results over hastily built lines, some of which even had to be improvised from unfamiliar and below standard equipment. Certain innovations, tested overseas, have since become standard practice at home after being refined to meet the needs of peaceful traffic. Since the war, also, an accelerated con-

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struction program has more than offset the lag resulting from the necessarily reduced programs of 1917-18. These two factors create an impressive margin of safety, indicating that the expansion of American trade and commerce is not likely to be slowed down by congestion in wire communications.

Certainly this expansion can never be halted as long as the telephone business continues to build for the future. No single year in the fifty of telephone history has recorded a shrinkage in telephone use. Telephones in the United States have multiplied from Bell's lone instrument to more than 17,000,000, or one to every seven persons in the United States; and the average number of telephone conversations daily has risen from less than 8,000,000 in 1900 to 70,000,000 in 1926. Nevertheless, there is no saturation point in sight; the public appetite for telephone service grows with every extension and improvement of that service. Apparently, the telephone industry is destined to grow as long as the United States grows; certainly it will continue to grow as long as individuals and groups through improved communications find it possible to increase production and sales, leisure and wages, profits and the pleasantries of life.



VIII

OF WAVE-LENGTHS

THE telephone art is still advancing as fast as brains and energy can push it. One of its branches, radio telephony, has lately experienced such a rapid growth that the layman may perhaps be pardoned for thinking of it as a separate process. In point of fact, wireless transmission of sound has been associated with the telephone almost from the latter's birth. The first transmission of speech by electromagnetic waves was accomplished by Alexander Graham Bell in 1880 with a radiophone which made use of the very short waves of the visible spectrum, a beam of light being varied in intensity in accordance with variation of the speech waves. Telephone companies were sending out weather reports and produce prices to their rural subscribers years ago. In 1915 Bell System engineers transmitted speech by wireless telephone to Paris and Honolulu, the first speech across the oceans in all history. Recently New York and London experimentally, have been in conversation through the joint use of radio and land wires, radio bridging the seas and wire carrying the messages from shore stations to their destinations. This indicates the rôle which radio seems best

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suited for in a person-to-person communications service.

The advantages of wires for transmitting the human voice at small expense, and with the utmost flexibility and privacy, have already been amply demonstrated on land; telegraphic cables offer enough of the same advantages to insure their continued use by the public for ordinary purposes. But as an alternative and supplementary service for both land and sea wires, radio telegraph stands forth as a tremendous triumph for the human family. The horrors of shipwreck are halved, now that radio signals can bring other ships at full speed to the assistance of the stricken vessel. Ocean going vessels are no longer isolated islands in a wilderness of water, out of touch with all save the elements. Instead, they remain part of the busy world. Their passengers can read radio news bulletins every day, buy and sell in world markets, and communicate with their friends on either shore or any vessel within range.

Radio telephony has a place on the high seas, from ship-to-ship and shore, and in transoceanic telephony which is still beyond the range of telephone cables. The world has been made smaller and safer, but assuredly not less interesting, by the application of this branch of the telephone art.

All radio messages must be broadcast, the lover's call no less than the President's message, the confidential "tip" no less than the marine distress signal or the program of a symphony orchestra. That necessity establishes certain limitations. The air is a poor medium for elec-

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trical transmission as compared with copper, and huge voltages of electrical energy are required to push a radio message home. This involves heavy expense which is seldom economically justified if the message can be delivered as promptly otherwise. Moreover, the air could accommodate, even under ideal conditions, only a fraction of the transoceanic messages originating in this country. But when the message is intended for countless ears, when publicity is sought, radio telephony performs a unique function in the best possible way and at low cost per hearer. However, it must be remembered that no small part of broadcasting is played by wire connections, over which programs and features are transmitted from one broadcasting station to another or from the performer at a distance to the broadcasting station. All the great radio audiences, such as those which listen to a Presidential message, are built on a foundation of inter-studio wire communications.

Broadcasting by radio telephone completes, in a sense, the national equipment for the destruction of rural isolation and political sectionalism. Its entertainment and educational features, properly cultivated, are sure to raise the general level of thought. Our growing appreciation of good music is a radio influence apparent to all. As one listens to the information and inspiration poured out by broadcasting stations, he cannot escape the conclusion that here is an agency destined to make our society more efficient, sympathetic, appreciative and cooperative. Radio does through the ear what the news-

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paper does through the eye and is fast earning a prestige, influence and public interest similar to that of the press.

Nevertheless it is in order to point out that the socializing force of radio broadcasting, while important, is subject to certain offsets. No broadcast can establish that intimacy of contact, that sense of active participation, which comes to every telephone user. Listening to a broadcast church service is less satisfying religiously than participating in public worship at the same service. Radio broadcasting extends the reach of the public man enormously, but it cannot extend equally the reach of the private citizen in his everyday affairs, as the telephone does. Broadcasting will hasten and bring to action trends of thought already under way, but small groups will still remain the guardians and sponsors for new ideas, issues and isms during their incubating periods. That is why radio's social effects may be justly described as mass efforts on a broad base but of shallow depth and in low relief, while more intimate means of communication plow their way into the social life, breaking the crust of custom and stimulating new adjustments in every relationship of life. One may fairly describe the social effects of radio broadcasting as obvious, since everyone knows that spraying the air with information and entertainment must influence to some extent social behavior. On the other hand the effects of more personal communications are often hidden or obscure.

Wire is so woven into modern life that by no means all of the reactions of human nature and the social order to

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telephone communication have been noted. Yet the forces and relationships of which society as a whole remains unconscious are precisely those which sociologists deem most worthy of study.

IX

OF MODERN MESSENGERS

THE FIFTY years since Alexander Graham Bell's invention of the telephone cover an advance in communications so rapid and continuous that one is easily tempted to prophesy. No doubt the future of the telephone art holds wonders equalling, perhaps surpassing, those which have already entered the pattern of existence. It requires little imagination, for instance, to believe that vocal communication between continents, already demonstrated experimentally, some day will become commonplace, and that such world-wide facilities for conversation must affect profoundly the relationships of states and peoples. This possibility, and others scarcely less striking, lends a deep public significance to the character of the group which will have the destiny of the telephone art in its keeping.

While new men and new ideas are constantly appearing in the telephone equation, the telephone group as a whole shows a continuity of purpose, a determination to carry on certain traditions, which are bound to be influential in the coming years. The telephone pioneers laid enduring foundations as respects public policy, busi-

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ness ethics and industrial relations, and these seem destined to endure, regardless of changes in techniques and systems.

Since 1876 the telephone group in America has grown from four to 400,000 persons—a vast army of skilled workers which embraces in its ranks a remarkably wide range of special talents. More than 5,000 persons at the headquarters of the Bell System are directly concerned with improving telephone communication. Of these, 3,500 form a research staff under a single head—a notable example of the stress which modern business places upon forethought. At a time when industrial research was far less common than at present, the telephone industry set an example in this regard which hastened the present effective union between business and science in America. All the specialized abilities of this large staff, all the resources of well-equipped laboratories, all the stored knowledge in the archives of the various sciences, can be concentrated upon any technical difficulty which limits the electrical transmission of the human voice.

In the whole breadth of America there is scarcely a village which does not contain members of the vast telephone group engaged in keeping the precious freight of words moving along the desired channels. Without cessation they are establishing connections at intricate switchboards, maintaining lines against the onslaughts of storm and flood and the decay of time, pushing new construction across the open country or burrowing under congested city streets. Still other thousands manufacture,

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to standards of extreme accuracy, the delicate instruments through which vocal communications pass.

The very delicacy of telephone operations imposes upon the organizations involved an extreme of systematized toil which reaches almost absolute perfection in human cooperation. One of these organizations handles 70,000,000 sales of service each day with a low percentage of error; one of the world's largest businesses has been built in a field where bulk sales are impossible, where accurate handling of multiple "littles" is the acid test. In still another respect, telephone advance marks the triumph of unremitting attention to minute things. The electric current used in voice transmission is the most delicate current commonly at the service of society. The capacity for taking infinite pains is the tap-root of the broadly branching telephone tree.

Various as are the tasks of the gigantic telephone army of America, its members are moved by a common purpose—to get the message through in the best possible way and the shortest possible time. In the morale of the telephone group of 1926 shines the same passion for promptness which thrilled weary Inca runners on their gruelling journeys from the capital to the outposts of the empire. Now as then he who is entrusted with communications accepts the fixed idea of his craft—that upon the go-between rests the well-being of the whole. Dramatically this gallant answer to responsibility for communications flares forth whenever an operator sticks to the switchboard in the "bright face of danger," when-

OF MODERN MESSENGERS

ever a lineman atop storm-swayed pole risks his life to heal a broken nerve in the nation's wire system. Undramatically but with equal vigor this spirit of the enterprise animates, as part of the unwritten law of their lives, many thousands of other workers in tasks which escape public notice. Thus this widespread army of telephone folk, though not under a single employer, has arrived at a rough-hewn solidarity of interest through their devotion to getting the message through.

Whoever helps, even in the smallest way, to speed the messages of men is the heir of the Greek runner, the Roman herald, the Pony Express rider. He inherits the Spirit of Communications—a deep conviction that becomes a creed, that *the message must get through*, whatever the cost.

To this sense of public responsibility is added the ever present lure of meeting the challenge of obstacles to be overcome; the thrill of combat with the forces of nature in their stronghold; the joy of doing a thing when that thing is difficult to do.

The delivery of the famous "Message to Garcia" needed no Elbert Hubbard to endow it with romance or to draw from it an inspiration. The work of the message bearer is inherently romantic and inspiring. For those who are engaged in any phase of communications, devotion to duty is almost a matter of second nature.

Among telephone workers, this sense of responsibility becomes doubly strong. From its very nature, telephone service is an intimate, personal service. The written mes-

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sage and the telegram are, after all, but the shadows of speech. The spoken word lives and has personality.

The men and women of the telephone group never know, moreover, the importance of the messages they are called upon to speed upon their way. Telephone calls carry no special delivery stamps—nothing to indicate what connection may involve a matter of life or death; nothing to foretell the far-reaching results that may follow failure to get every single call through to its destination.

With those who make this personal and vitally important service possible, fidelity to duty reaches far beyond mere pride in doing one's job as well as it may be done. It arises from a sense of the dependence of the public upon each individual telephone worker. It is expressed in a loyalty that manifests itself in a hundred ways in the day-to-day routine of telephone life, and that, in times of emergency, often rises to the highest form of heroism.

Observing such an industrial group in action, with its superb equipment, dynamic tradition and sound morale, one can be sure beyond all question that the future of the telephone will not belie its inspiring and influential past.

Designed
by Morris Colman
Printed in November 1926
by Sidney A. Storer
New York

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