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MANY MINDS AIDED IN CAPTURING RADIO

By SILAS BENT

RADIO is the youngest and the most precocious of our industries. It is the most fantastic. Five years ago it was too insignificant to be classified separately by statisticians; last year the people of this country paid a million dollars a day for radio sets and parts. We have a telephone for every eight persons, an automobile for every ten; the ratio of radio is only one to thirty five. The lusty youngster has just begun to take the air.

By radio I mean the world's only system of one-way communication. I mean broadcasting, ethereal telephony, as opposed to wireless telegraphy, its elder brother. Both are the piky grandchildren of Franklin, discoverer of that invisible though

Of the Magical Consequences Not the Least Is the Prodigious Business That It Set Going

the wireless? Only scientists were interested in it, only cranks would give their time to the preposterous toy. It was not until 1862, half a century after Faraday contrived his little stack of zinc and copper disks, that Heyworth patented a method of conveying electric signals without the intervention of any continuous artificial carrier.

Significant facts were picked up now and then, significant forecasts were made. An English scientist told the Royal Society in 1867 that electric waves in the air could be used for telegraphing. Ten years

searches. In March of 1897 he sent wireless messages four miles, in July ten miles, and before the year ended he had built two wireless stations. Seven months thereafter a sporting event was reported by wireless to a Dublin newspaper.

De Forest, one of the pioneers, was taking out patents in the United States, commercial stations were being established abroad, a few ships carried the equipment. But wireless needed to be dramatized before the public would pay much heed to it. The thrill came when the Republic

through a new wireless code—"S O S" this time—the stocks of companies began to boom. Marconi shares which had been selling at \$10 went to \$350 in a wild market. Then came collapse, receiverships and tribulations to persons even so eminent as Lord Reading and David Lloyd George.

In that year the United States Government began licensing radio operators and transmitting stations. The elder brother became, a commonplace of our lives. Let us leave him now and turn to the more

sels more than half a mile apart, then between warships more than eighteen miles apart, then forty-four. It could be done even when land intervened, although skeptics had said it couldn't. Then the World War came, and the great nations centred their attention upon wireless as a means of communication already well developed; but Howard Armstrong, a youthful student in electro-mechanics at Columbia University in New York, in October of 1914, took out a patent on a regenerative circuit, known now as the "feed-back" or the self-heterodyne.

During the next year telephone messages were sent through the air five thousand miles, and in the succeeding several years, despite preoccupation with the drama going

sometimes flashing elf, electricity; but wireless had come into his industrial majority before radio as a business was born.

CHAPTER I.

Faraday and Morse

Sixty years after Franklin overthrew the "friction" idea of electricity, a young Englishman, experimenting with some copper half-pennies, disks of zinc and paper moistened in salt water, performed his first miracle. He set up a mysterious current which decomposed sulphate of magnesia. Within the year he had begun those revelations in the electromagnetic field and the conduct of electric current by wire, which were the forerunners of radio, discoveries which have brought the Continent of Europe within one-fiftieth of a second of North America, have made Pittsburgh jazz audible in London and have constituted our dinner concerts the simultaneous breakfast music of Cape Town.

Between Faraday's rotating magnets and the broadcasting to a million ears of a Gigli solo an amazing path was to be trod. Almost at the same time Morse in the United States, Cooke and Wheatstone in England, were to take out patents for the electric telegraph. This was in 1837, and five years later Morse flashed words over copper wires between Baltimore and Washington. From Faraday the hook-binder to Morse the artist was the span of a generation, but electricity linked their later years; and even before Morse died, full of honors, an American transatlantic cable was under way.

From hilltop bonfire and trumpet call man had progressed unhurried to the written message, the courier and the stagecoach. Now a spitfire imp was delivering in staccato his messages, his condolences and his warnings, delivering them with uncanny speed. Heat-logic in England, moreover, was experiment-



That Flashing Elf, Radio, Steps Forth From Father Zeus.

ahead on the Continent, progress was made in the development of valve generators and receivers. Air craft were equipped with radio-telephones as well as with wireless telegraph instruments. At the close of 1919 the governmental ban on private and experimental radio stations, imposed as a war measure, was removed; and then the Radio Corporation of America was formed to pool the patents outstanding, so that the work might go ahead without too much litigious interference.

A new industry was in its swaddling clothes. With the flying machine, the conquest of the air was begun. Now it was to be completed. The results of the national election of 1920 were radiocast, none too successfully, to a few listeners; and in the last quarter of 1921 the first Federal licenses were issued for broadcasting stations. Isolation was at an end; even privacy was threatened.

It is customary to say that radio as an industry began in 1920, but its beginnings were in small concerns which made transmitters and receivers, more or less experimentally, to meet particular needs. Sometimes several sets of a single model were made for one customer, but improvement was going ahead so rapidly that equipment became obsolete almost overnight. The radio set was a perishable commodity, and the manufacturing of it an extra-hazardous business. Large-scale production was out of the question.

The amateur radio fan made the market, and after the crystal detector, with its limited range, gave way to the vacuum tube receiver and amplifying devices the demand advanced in seven-leagued boots. The supply could not keep pace with it.

The value of the radio equipment manufacturing business now is twice as great as the value of the rug and carpet business.

ing with a "magic lyre," and a Massachusetts physician, Dr. C. G. Page, drew attention to the musical note produced by rapidly revolving the armature of an electromagnet in front of the poles. Only the hint was needed: Bell, Branly, Trowbridge and the others of that adventurous company were not long in finding a way to send the human voice itself over the wire. Was it not enough?

CHAPTER II.

Pioneers in Radio

In the presence of telephonic and telegraphic magic, why bother with

later the phenomenon was discovered on which depends the action of the coherer. Bell, Dolbear and Edison in America, Hertz in Germany, Heaviside and Preece in England were among the inquiring and persistent vanguard that wanted to find out more about the toy; and then, from an unexpected quarter, word came that an Italian had had demonstrated that the Hertzian wave could be used for signaling without wires.

Marconi, son of an Irish mother, applied in London for patents, in Ireland for capital to pursue his fe-

of the White Star Line collided off Nantucket on Jan. 23, 1909, with the Italian steamship Florida. Into the air went a singular call, "C Q D! C Q D!" Jack Binns, wireless operator, was at his key and in distant reaches of space the message was picked up. Fifteen hundred lives were saved and radio-telegraphy was on the world map. All vessels carrying more than fifty passengers were subsequently required to equip with it.

And after the sinking of the Titanic in 1912, when the saving of 700 survivors was made possible

prankish, more boisterous and withal hetter member of the family.

CHAPTER III.

Wireless Telephony

During the steady advance in the science of wireless telegraphy electrical engineers were learning more and more about the strange fluid which was the god from their machine. From the telegraph to the telephone had been but a step; from wireless to radio was no further. A little more than ten years ago successful experiments in wireless telephony were carried out between ves-

It is nearly three-fourths as great as the jewelry business, including clocks, watches and engagement rings for June weddings. There are nearly 5,000 manufacturers. Between twenty and thirty thousand concerns are distributing sets and parts, and the vacuum tube is supplied as readily as an incandescent bulb. There are more than 500 broadcasting stations. The Federal supervisor of Radio announces reluctantly that all available wavelengths are in use and that he can't issue another broadcasting license

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unless some generous station is willing, like a traveler dividing his dinner, to share its wave-length. In 1921 there were only two such stations. In ten of those now established and owned by a few big corporations the investment is \$2,000,000, and their annual maintenance costs half as much.

Probably there will not be many more new stations. The tendency is toward fewer and fewer. The growth will be in another direction, the direction of the home, and in promoting that growth the industry spent last year \$18,000,000 in advertising. There are about 26,000,000 homes in the United States, and at least 21,000,000 of them are without radio equipment. The dealer's profit on a single expensive set is more than on a Ford, and the sale of sets in this year of grace is almost certain to outstrip the sale of phonographs, which have been taken with open arms into 10,000,000 homes. But in many of these sales the two will go together, for they have joined hands within a single cabinet; you may now get your dance music, as you choose, from a rubber disk or from the heavens.

A thousand newspapers are setting aside special space or special sections for this baby giant, which had been hailed as a competitor of the press. News may be radiocast with greater speed than newspapers

can take it to the street and to the home, and several American newspapers operate broadcasting stations. The debates of the last national political conventions were broadcast; church services, theatre performances and football games are described to waiting millions as they take place, yet newspaper circulation, theatre, church and sports attendance do not seem to have suffered on that account. Whether or not they suffer, it is clear that radio has taken its place in the newspaper as a matter of public interest and a matter of news, along with the theatre, the church and sports.

During its brief life radio has had its periods of boom and bust. It has exemplified in short order the cycle through which every new industry must travel, or at any rate may be expected to complete the cycle during this year. It has found its detractors as well as its admirers; and it has become the prey of the dishonest in several ways, like every honest business.

Your neighbor's loud-speaker across the way may annoy you, and a lover of Adirondack solitudes and silences may be startled at any moment by the latest blues from a Boy Scout portable; but the same power cheers the bedridden invalid, gives the crop reports and weather forecast to the farmer, supplies the tenement home with amusement or instruction. It is the most talkative member of many white collar families. And those men beyond the

reach the postoffice in Wyoming, explorers icebound in the Arctic, wanderers lost to civilization in Brazilian jungles, Beebe nosing about the fabled Sargasso Sea, all have kept in touch with the world and abreast of the times through the radio.

When you hear the President's matter-of-fact tones or Gigli's tenor, you hear a sound which has been amplified by fifty billions. If all the people of all the world were to lift their voices by some chance at a single moment, their combined vocal energy would be only one-thirtieth of Mr. Coolidge's quiet sentences by radio. Is it too much to suppose, when facing such a development as this, that the time is not far distant when, with the aid of the wonder worker, we shall see as well as hear distant events?

Aside from Franklin, who was busy with the affairs of early America and had no time to prove his conjecture about electricity till he was 40, youth has been the seer, the prophet and in unrecorded ways the developer of these wonders. Faraday in England, Morse in New York, Marconi in Italy before his pioneer demonstrations in Ireland, Howard Armstrong and Hazeltine in the United States have done their most amazing work in their teens, and Edison was merely a boy when he began communicating with the invisible elf, electricity. Youth will be served. To youth has been given the vision of the pathway into the air.