

Early Handsets

By H. A. FREDERICK
Transmission Instruments Director

THE first telephone, invented and patented by Alexander Graham Bell in 1876, was a very simple device. In principle it resembled the telephone receiver of today, but was used for both speaking and listening. Although thoroughly adequate for the demonstration of a principle, such an arrangement was decidedly inconvenient for practical use. New fields for the exercise of human ingenuity were opened, however, by this brilliant invention, and the next five years witnessed an extraordinary activity all over the world in the invention of modifications and applications of Bell's fundamental discovery. As we look back on them, however, all these ideas and inventions did not appear in what we would now consider their logical order. Some of them could not be successfully applied

until later improvements had rendered them practical.

An understanding and appreciation of Bell's invention was extended to England by his demonstration lecture before the Society of Telegraph Engineers in London in October 1877. The inconvenience of first listening with an instrument and then talking into it seems immediately to have impressed two Englishmen. Charles A. McEvoy, an employee of the London ordnance works, apparently the first to act, patented the two arrangements shown in Figure 1. One consisted simply of a speaking tube connecting the air space back of the receiver with the mouth, so that the receiver could be held continuously to the ear. The other was a clumsy but effective device for holding two of the early hand receivers: one in position for talking

and the other for listening. These proposals disclosed the first handsets. Only six weeks later, G. E. Pritchett, an architect, obtained a patent somewhat extending the ideas disclosed by McEvoy. Pritchett also shows both a speaking tube connection around to the mouth from a receiver held to the ear, and two instruments on a curved and adjustable handle—one to be used as a transmitter and the other as a receiver. In addition he shows a considerable variety of branched arrangements of speaking tubes connecting into the instruments so that several people could use them simultaneously. He stressed the importance of so arranging the apparatus that it could be mounted on the head and shoulders of the users, thus leaving the hands free. None of these devices appear to have been used commercially by their inventors, partly because of the absence of practical telephone systems, and partly because any of the devices would have been somewhat too inefficient for satisfactory use.

In the following year—1878—the Gold and Stock Telegraph Company, a subsidiary of the Western Union Telegraph Company, proceeded to establish telephone-exchange service in the New York district. Rights

were acquired to the Gray receiver and the Edison transmitter patents. Many novel devices had to be originated to provide telephone service, but in the light of our present switchboard practices, this early system seems very crude and elemental. A view of the exchange is shown in the photograph at the head of this article. It required the operator or switchman to move from one switchboard to another to complete a call. Since he had to carry the telephone instrument with him, the most portable form possible was desirable. Robert G. Brown, the chief operator of the first Gold and Stock exchange, was responsible for a number of the original features which were used there. Not the least important of these was the arrangement he developed and introduced in 1878 of a combined receiver and transmitter. This combination was dictated entirely by the practical needs of the situation and appears to have been developed without knowledge of either of the inventions mentioned above. Unlike McEvoy or Pritchett, Brown used an Edison carbon transmitter. Since Edison's first transmitter was patented in 1877, it seems quite possible that neither McEvoy nor Pritchett were familiar with it at the time their patents were filed.

The handle of the Brown handset, shown in Figure 3, consisted of a curved iron bar which formed part of the magnetic system of the receiver. Connections from the transmitter and receiver were brought out through flexible cords which terminated in plugs. A switchman

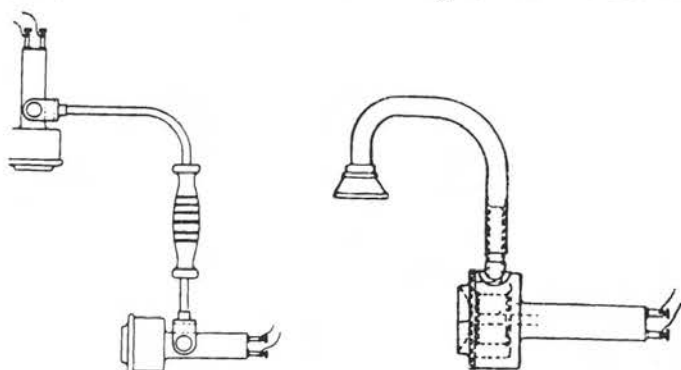


Fig. 1—The first suggestions for avoiding the necessity of moving the Bell telephone back and forth from mouth and ear were made in England

could carry this apparatus to any section of the room and plug it into the switchboard to which he had been assigned to answer or complete a subscriber's call. At the time these first handsets were made and put in use, Brown was apparently more interested in getting the new switchboard into operation than in protecting his ideas by patent, so that it was not until September 1879 that he realized the novelty of his device and filed patent application. His first broad claims to the combination of a receiver and transmitter on a handle were rejected on the grounds that the idea had been anticipated by Pritchett. Brown therefore amended his application, and in 1880 a patent was granted covering the specific arrangement of instruments as they were used at the Gold and Stock exchange. The "universal switch", one of the Western Electric Company's early switchboards, was also used there, and for some time after these two devices seem to have been associated.

The performance of these first exchanges in New York was considered so successful that both the devices used there and some of the men associated with their development found their way abroad. In 1880, La Société Générale des Téléphones was formed in Paris by the union of three companies which had been organized and granted concessions the year preceding. Brown was drafted from the Gold and Stock Company in New York to serve as electrical engineer of the Société Générale in Paris. The exchange which he helped to establish used his handset which still employed the Edison variable-resistance, carbon-block transmitter. This appears to have been the first use of the handset in Europe. These first Paris exchanges employed women as operators, instead of men as the New York exchanges had done, and the Brown handset was found undesirably heavy. As a result there was an active demand for the development and improvement of the handset, particularly

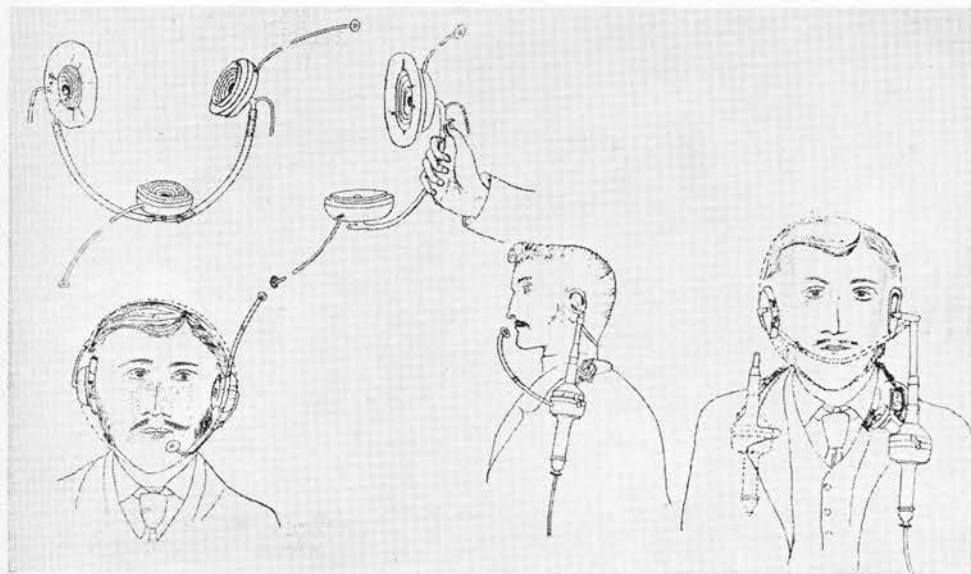


Fig. 2—The early English patents suggested the handset in appearance, but were never given practical application



Fig. 3—The first commercial handset was invented by R. G. Brown, and used by the Gold and Stock Telegraph Company of New York

that it be made lighter and more convenient.

A simpler and lighter set was designed by M. Berthon, chief engineer of the Societ  General in Paris, which used a Berthon transmitter and an Ader receiver. This set performed sufficiently well so that its use spread through the provinces of France, not only for operator's use, Figure 4, but for subscribers' intercommunication service, for which there was an increasing demand. This form of service was extended to include communication with other houses in the district. The earliest use of the handset by subscribers was probably at this time which was about 1882. From this time on the handset saw considerable development, and was improved in appearance, size, and convenience. It was used in Europe both for ordinary telephone systems and for PBX service, and has been known as the "Microtelephone".

In America the operator's handset was used only until about 1884, and its use was not extended to subscribers. In this period the relatively insensitive Edison transmitter was replaced by the more efficient Blake transmitter. This transmitter, how-

ever, could be used only in a vertical position, and thus was not suitable for handset use. For switchboard use the transmitters were mounted vertically in a convenient position in front of the operators, and the receiver of the handset was replaced by the head receiver invented by W. L. Richards in 1884. For subscribers' use, the better per-

formance of the Blake transmitter and



Fig. 4—Brown took his early handset to France, where it was used in the early Paris exchanges

the subsequent granular carbon types, led to the development of a telephone system along the line of wall sets and desk-stand sets which permitted the application of these transmitters to best advantage. Such use of these transmitters made it feasible to work to higher standards of transmission service, than in those countries where the less efficient handset was employed for regular service.

As the years passed, foreign manufacturers were active in pushing the sale of their various handsets in this country, but as already pointed out, their use was necessarily restricted to limited classes of service and for inter-communication systems. The available types of handsets were not adequate for general use in the Bell System with its better transmission standards.

The convenience of the handset was recognized by the engineers of the Bell System, however, and laboratory studies were carried on for years with the object of so improving its performance as to make its more general use possible. A few years ago these developments reached the stage of suitable performance, and commercial production was at once started. By this time, the handset had acquired the reputation of being an European product. It is interesting to remember, however, that the first practical handset was made in this country, and that although it was taken abroad, and there somewhat improved, its development to a stage where it was suitable for use under the service conditions in this country is an American achievement.



Set-up for measuring the "q" of circuits tuned for wavelengths in the neighborhood of 60 centimeters. W. E. Kirkpatrick of the Research Department is adjusting the microscopic condenser of the tuned circuit