

to workmanship but to the principle, which was adopted as the basis of what had to be done—that of transmitting speech by electricity.

Bell focused his efforts on matters of speech transmission and speech reception, which eventually led to his later experiments on electric telephony. His experiments were based largely in part on others' work on speaking telephones that were not electric and electric phones that could only transmit music but not the human voice.

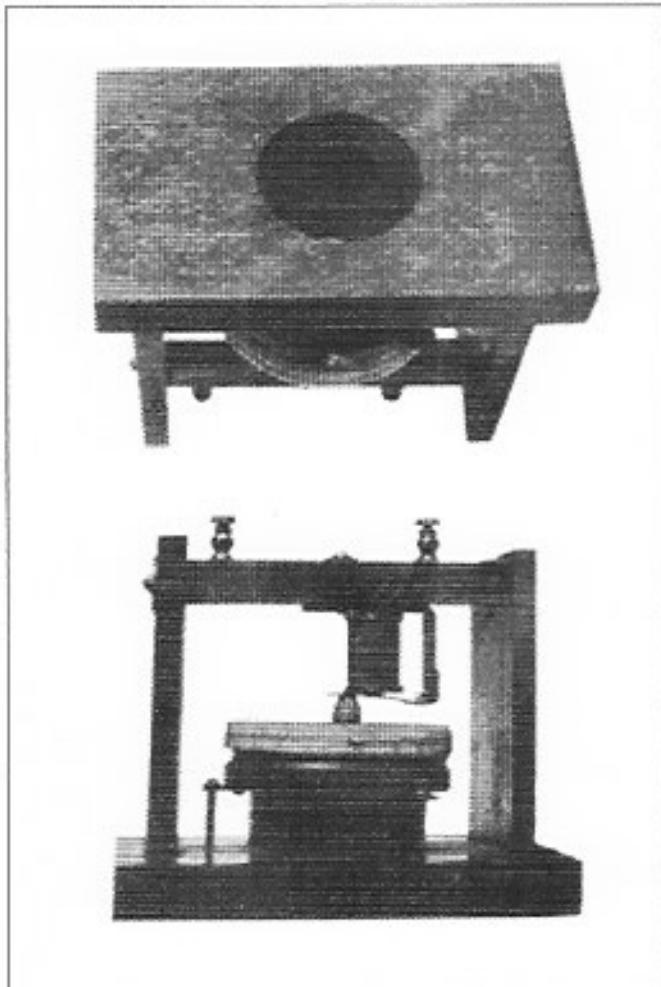
In the early summer of 1874, while he was puzzling over a musical apparatus, the faint outline of a new idea came to him. He had been making experiments with two remarkable machines—the phonograph and the manometric capsule, by means of which the vibrations of sound were made plainly visible. If these could be improved, he thought, then the deaf might be taught to speak by sight—by learning an alphabet of vibrations. He mentioned these experiments to a Boston friend, Dr. Clarence J. Blake, and he, being a surgeon and hearing specialist, naturally said, "Why don't you use a real ear?"

Such an idea never had, and probably never could have, occurred to Bell; but he accepted it eagerly. Dr. Blake cut an ear from a dead man's head, together with the eardrum and the associated bones. Bell took this fragment of a skull and arranged it so that a straw touched the eardrum at one end and a piece of moving smoked glass at the other. When Bell spoke loudly into the ear, the vibrations of the drum made tiny markings upon the glass.

To an uninitiated onlooker, nothing could have been more ghastly or

absurd. How could any one have interpreted the gruesome joy of this young man, who stood earnestly singing, whispering, and shouting into a dead man's ear?

What had this dead man's ear to do with the invention of the telephone? Much. Bell noticed how small and



Alexander Graham Bell's first telephone

thin was the eardrum, and yet how effectively it could transmit vibrations through heavy bones. "If this tiny disc can vibrate a bone," he thought, "then an iron disc might vibrate an iron rod, or at least, an iron wire."

The conception of a membrane telephone was pictured in his mind. He saw in imagination two iron discs, or eardrums, far apart and connected by an electrified wire, catching the vibrations of sound at one end, and reproducing them at the other. At last

he was on the right path, and had a theoretical knowledge of what a speaking telephone ought to be. What remained to be done was to construct such a machine and find out how the electric current could best be brought into harness.

Working with an expert technician, Thomas Watson, Bell experimented with the idea of transmitting the human voice via electricity over wires. Time and time again there was nothing but failure. Then, on March 10, 1876, the famous words were heard, "Mr. Watson, come here, I want you."

Watson, who was at the lower end of the wire, in the basement, dropped the receiver and rushed with wild joy up three flights of stairs to tell the glad tidings to Bell. "I can hear you!" he shouted breathlessly. "I can hear the words."

After succeeding, they filed for a patent and received it on March 3, 1876, patent no. 174,465.

It was a close shave for the young inventors. By one of the strangest of coincidences, another inventor, Elisha Gray, filed a caveat on the subject on the same day that Bell filed the application for a patent. Bell had arrived first. As the record book shows, the fifth entry on that day was: "A. G. Bell, \$15," and the thirty-ninth entry was "E. Gray, \$10." Western Electric, co-founded by Gray, was to become one of the Bell System's major competitors later.

Success wasn't immediate and acceptance of the device was not easy. Most considered it more of a toy than a useful invention of major consequence. With the assistance of a few determined people the telephone was finally on the way to being accepted when a plethora of lawsuits and other