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part of the Alexander Graham Bell Family Papers at the Library of Congress  
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Pages 24 and 25, from Bell’s account of the transcontinental phone call as published in  
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Edwin S. Grosvenor and Morgan Wesson (New York: Harry Abrams, 1997).

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CHAPTER 1

# MESSAGES AND SOUND

In the mid-1800s, telegraph offices were bustling places. Instead of sending information by mail, more and more people used the telegraph.

I hope this line moves quickly. I'm in a hurry to send a message. My son needs to know Mother is ill.

Where does he live?

Ohio. If I sent this message by mail, he might not find out for weeks.

Telegraph operators sent messages in the form of dots and dashes using electricity. The dots and dashes, known as Morse code, stood for letters and numbers.



Inventors around the world were experimenting with sound, electricity, and the telegraph. They were all looking for ways to improve the way people communicated.

What could be faster or better than the telegraph?

Nothing. People will always need to send messages.

In 1865, an 18-year-old teacher from Scotland named Alexander Graham Bell was also interested in communication. Bell began his own experiments to measure the pitches and vibrations of sounds.

If I can figure out how vibrations in the throat make sounds, then I can help my deaf students speak more clearly.

Aaaahh, Ayyy, Eeee . . .

Some sounds have strong vibrations. I wonder why?

Vibrations in the throat make speech.

But I thought people needed to hear to be able to speak.

Not at all. Hearing helps, but it isn't necessary for people to speak.

Bell's research surprised him and pushed him in new and unexpected directions.

Bell soon began to research sound. He studied experiments of other scientists.

Could sound be sent electronically, across telegraph wires?

Over the next few months, Bell became more fascinated by the idea of sending sound across telegraph wires. He spent his free time learning about electricity and the telegraph.

I'm not sure I understand your work, Bell. What do you hope to achieve?

If I could send sound over the telegraph wires, some day we could talk by telegraph.

For nine years, Bell slowly developed his ideas.

In 1874, while living in Boston, Massachusetts, Bell continued to teach deaf students to speak.

You force air up from your lungs into your throat. Vibrations in your throat will make sound.

Oooo ...

Ooooo ...

He also found time to invent.

When this machine works, people will be able to send messages using sounds.

If I can send different sounds at the same time, I can send more than one message at a time.

Then telegraph operators just have to listen for one sound.

In 1874, Bell tried filing a patent for his harmonic telegraph. A patent would give him the right to make and sell his invention in the United States.

I'm sorry, Mr. Bell, but you're not a U.S. citizen. I have to see your invention work before I can give you a patent.

But I'm not sure how long that will take.

I'm just following the law.

After his patent problems, Bell wasn't sure what to do next. Hoping to improve his telegraph ideas, he measured sound waves. Bell studied how sound waves traveled through a model of the human ear.



Bell noticed that the sound vibrations in the ear's thin membrane help people hear sounds.



Could sound be produced through vibrations on steel or another material? What might happen then?

This research led Bell to his idea for the telephone.

CHAPTER 2  
**AN AMAZING SOUND**

After completing more research, Bell showed his harmonic telegraph and early telephone plans to Gardiner Greene Hubbard, a patent lawyer.

I believe my ideas have merit, but I need money to continue my work.

Your telegraph could make us rich, Mr. Bell. I'll give you money for supplies and an assistant.

Thank you, sir. You will not regret this.

In early 1875, Bell welcomed his assistant, a young machine builder with electrical knowledge named Thomas Watson. Watson's knowledge of electricity sped up the invention process.

What was the problem, Mr. Watson?

The electrical currents weren't strong enough. Sounds should now move smoothly from the transmitter to the receiver.

A few months later, Bell and Watson used the harmonic telegraph to send different sounds.

I wonder if Bell can hear these sounds?

Aha! The sounds sent by Watson came through clearly. If we can send sounds, could we transmit voices too?

Excited by his success working with Watson, Bell met with Professor Joseph Henry, an electricity expert.

I'm working on a device that transmits human voice. We could talk instantly over the wires.

This human voice invention could change communication.

You have a good idea. Work at it.

Despite the professor's advice, Hubbard wanted Bell to work harder on the harmonic telegraph.

I don't care what the professor said. Forget about your human voice invention. The telegraph will make us a fortune.

But, sir.

Back at work on the harmonic telegraph, Watson tightened some wires.

I could hear a full set of tones coming across those wires.

If I change the strength of electricity as it travels across the wires, I should be able to send any sound, even speech.

With the right amount of electricity, that should work.

That same day, Bell looked at early drawings of his human voice invention. By nightfall, he had drawn plans for his first telephone.

Our human voice machine should look like this.

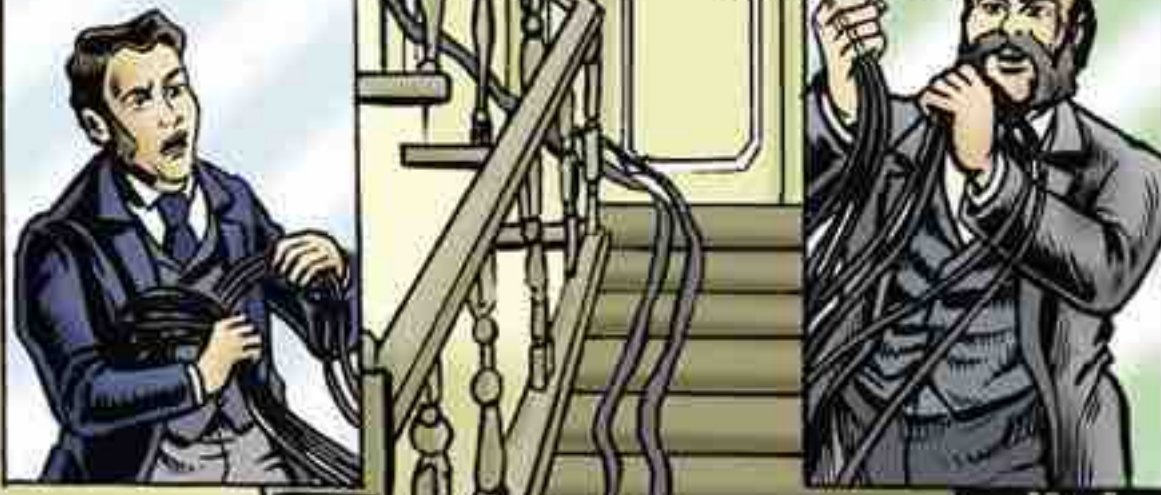
The cone-shaped design should capture voice well and make listening easier.

Over months, Bell and Watson worked on the telephone, trying to send sounds over the wires.

The telephone will need to transmit both weak and strong sounds if it is to carry different pitches of the human voice.

And once their invention was able to transmit some sound, Bell filed a patent. He received it on March 7, 1876.

On March 10, Bell and Watson worked on the telephone in separate rooms of a large house.



They were ready to test their telephone when . . .

Mr. Watson, come here.  
I want to see you.

What? Did I  
really hear his voice?

They tried the experiment again, with  
Bell listening for Watson's voice.

Mr. Bell, do you  
understand what I say?

Mr. Watson, it does  
work! We have sent  
voice over the wires.

Simply amazing!



Mr. Bell! I heard your  
voice loud and clear in  
the receiver. You said,  
"Mr. Watson, come here.  
I want to see you."

Are you sure you  
didn't simply hear  
my voice through  
the walls?



CHAPTER 3  
**ACROSS  
THE  
WIRES**

In 1876, in the months following the successful test of the telephone, Bell hoped to interest people with his new invention.

The telephone allows people to send their voices across telegraph wires.

Ahhhh.

Brilliant!

But is it true that the person at the other end of the line can't reply?

Yes, but we're working to change that. Soon people will be able to speak back and forth over the wires.

Bell traveled to Philadelphia for an exhibition of inventions. He demonstrated his telephone before a panel of judges.

Mr. Bell is in a room down the hall with his telephone. Please, go and tell him to begin.

Do you understand what I say?

Amazing!

The judges took turns trying out Bell's invention. Judges were thrilled by what they heard.

To be or not to be . . . that is the question.

I have heard. I have heard.