



Episode 811, Story 1: Clock

Elyse Luray: Our first case examines this peculiar-looking clock, and its surprising influence on 19th century America. In the early 19th century, much of the United States still resembled the Jeffersonian ideal. Yeoman farmers, working from sunrise to sunset, their comings and goings measured by nature's design. Time was local and personal — a glance at the sun and its falling shadow. But the industrializing United States stood at the dawn of a new era, and technology would soon transform how its citizens measured their days and calculated time. Now, a woman from Empire, Michigan, wonders if the ticking she grew up with could have been a part of this historic moment.

Cherrie Stege: It's about time we figured out the mystery of my grandmother's clock.

Elyse: I'm traveling to Empire to meet Cherrie Bricker Stege.

Cherrie: The clock was given to my grandparents by an uncle of my grandmother, John Mayo, in the early 1900s.

Elyse: What do you know about John Mayo?

Cherrie: He had a jewelry store in Chicago, but that's all I know.

Elyse: How does the clock work?

Cherrie: It needs to be wound, it's not electric. It keeps very good time.

Elyse: It doesn't look like a normal clock that you would hang on your wall. It has the minutes going around, and the normal one through twelve is kind of down here in a smaller version.

Cherrie: It's interesting in that it has a separate second hand, which not all clocks do.

Elyse: Has it always been in this condition?



Cherrie: In the 1960s, the clock was refurbished and cleaned. The actual face with the numbers was replaced at that time.

Elyse: During that restoration, Cherrie says, a mysterious mechanism and wires were removed. Family lore as they connected somehow to the Western Union Telegraph system. Okay. So what exactly do you want me to find out?

Cherrie: My grandfather told us that it had something to do with timekeeping for the United States. To me that seemed a kind of elusive remark. I would like to know the significance of this clock.

Elyse: Okay, well I can't take it with me, so I'm going to need to take some pictures. Cherrie offers to help take the cover off the clock. But truthfully, there is very little to go on. There's a couple of things I can tell just by being an appraiser. When I look at the clock I can tell that it's gothic revival. The arches here, the pointy pieces here, which usually dates to about the mid-19th century. Cherrie mentioned that this face has been replaced and I don't see a makers mark here or in the back. The interior mechanism is made of brass. Brass was an expensive metal at the time, so this clock was likely a high-end timepiece. There's this wonderful pendulum. It's almost like there's some type of metal or something inside. It's silvery and grey and it has bubbles and I have no idea what that is. She did mention that there were wires. What the wires may have done is impossible to tell. We'll see what we can find out. Cherrie says that her family thinks that the clock may have been used to regulate time. Time regulation — meaning a standard system of keeping the same time over a specified area — is an idea that took shape with the industrial revolution. It says here that the first regulation of time was actually in England. Time was set by solar measurements taken by the Royal Observatory in Greenwich, a standard that was known as Greenwich Mean Time, or GMT. Greenwich Mean Time was adopted across the island of Great Britain by the Railway Clearing House in 1847 and almost all railroad companies the following year. In 1880, laws were passed requiring all of Great Britain to use the GMT standard. But in the United States, different entities competed to regulate time. Western Union teamed up with the Naval Observatory in 1865, transmitting the observatory's solar time settings to naval ports and agencies. Cherrie's family said that this clock was used by Western Union. Was the clock somehow part of this system?



Patricia Atwood is an appraiser and clock expert. We've arranged to meet at the American Clock and Watch Museum in Bristol, Connecticut. So here are some photographs of the clock. First impression, what do you think?

Patricia Atwood: well the first thing is something that everybody would notice when you look at this dial. Is you say, wait a minute? What time is it?

Elyse: Patricia explains that in the photo I took, the clock reads 3:46 and 28 seconds.

Patricia: What's important here are the minutes, which are on the outer edge, and the seconds which are on the top dial. And then the hours are just an afterthought at the bottom.

Elyse: Patricia believes this arrangement of dials can mean only one thing.

Patricia: Anyone who knows anything about clocks would say that is a regulator.

Elyse: And what exactly is a regulator?

Patricia: It's a very precise clock that's used to regulate other clocks or watches or regulate something else. It's the standard.

Elyse: Being able to read precise minutes and seconds was of greater importance than checking the hour. Patricia says our clock's pendulum is also telling.

Patricia: There's a glass tube that's filled with mercury. That is a mercury-compensated pendulum.

Elyse: Mercury? Why mercury? Patricia explains that a pendulum clock keeps time because of the consistent swing of the metal pendulum. Changes in temperature can interfere.

Patricia: When the temperature varies the length of the pendulum, the metal expands and contracts. That's terrible for time measurement. What the mercury does is it will move in the opposite way to counterbalance for the expansion and contraction of the metal. And the net result



is that the movement of the mercury will counterbalance the movement of the metal and keep it the same.

Elyse: In your opinion, who made this clock and what time period is it? Patricia explains that the style and craftsmanship of our clock leads her to believe it was made by Edward Howard. He made high-quality timepieces from the 1840's until he retired in 1882.

Patricia: He was known for making the very best clocks of his time. He was known for making, precision regulators like this.

Elyse: Patricia explains that the earliest known Howard regulator clock with a serial number dates to 1865. Because our clock doesn't have a serial number, she believes it was made earlier.

Patricia: I think that it's an E. Howard Regulator that was made approximately 1860.

Elyse: The people that own this regulator said that at one time there were wires hanging from it. Does that make sense to you?

Patricia: Probably that has to do with the telegraph. You have gears clicking inside the clock. And there's one that would go every second. If you can attach a little wire so that it touches, touches, touches, touches, you can transmit the time. You can transmit every second.

Elyse: Do you think that this clock could have been used by Western Union?

Patricia: Generally the clocks that I think of used for Western Union were called self-winding clocks and they were later. They were in the 1880's and they didn't have pendulums.

Elyse: Patricia's not sure where or for whom our clock regulated time.

Elyse: She suggests I speak with Michael O'Malley, who has written extensively about how the United States attempted to standardize or regulate time. He agrees to meet me at the Adler Planetarium in Chicago. All right, so here's the picture of the clock I have. And I'm pretty sure it's pretty mid or late 19th century.



Michael O'Malley: It looks like it. It looks like a pretty fancy clock. This would have been somebody's -- somebody would have been pretty proud of this. This looks like kind of a display of expertise I think.

Elyse: Michael agrees it's a regulator, and explains how the clocks were part of an effort to bring order to a chaotic and patchwork system of time keeping.

Michael: Before the Civil War every city and village and town in America kept its own standard of time. They just looked at the local sun. When the sun passed directly overhead it was noon, that's it. Time was a function of where you were on the earth. Your town 20 miles away would be running on a different noon. It might be five minutes different. It might be just a couple minutes different. It might just be a few seconds. But it would definitely be different.

Elyse: Do all these different times cause problems?

Michael: It doesn't really cause problems until you have the telegraph or until you have travel fast enough to notice it.

Elyse: As the nation expanded westward and cities grew, regulating commerce and communication was increasingly difficult with locally based time.

Michael: When you need that instantaneous communication between cities it becomes more apparent, the differences between two different places. If you're doing business on the Philadelphia Stock Exchange with a New York Stock Exchange you notice that New York closes earlier than Philly.

Elyse: Michael explains how local time gave way to a system of regional times, which were often fixed by the major railroads serving those regions.

Michael: Eventually Philly runs on a kind of regional Philadelphia time. New York runs on New York time. Boston runs on Boston time, Pittsburgh on Pittsburgh time.



Elyse: How many regional times did we end up with?

Michael: By the 1870s there are 70 some regional times.

Elyse: That's crazy!

Michael: Yeah, it's really pretty remarkable. Every city, ever railroad, runs on its own standard time.

Elyse: Why would the railroads end up setting the time?

Michael: Well they're the big dog in the economic game. They're the ones that -- they're carrying the commerce. They're essentially life of the town. So they introduce their own standards and they assume really people will take their time from the railroads.

Elyse: Michael explains that the railroads also saw how taking the lead in regulating time was valuable public relations. A rash of tragic train accidents had given the railroad industry a bad name.

Michael: The railroads can claim that they run with clocklike precision. That it would stop accidents.

Elyse: Many of the railroad accidents of the day were blamed on poor management, or even disregard for safety.

Michael: I don't think it ever did stop accidents. I don't think accidents were caused by lack of synchronized time, but they would often say that. We get this really precise signal, so our railroad runs like a finely tuned watch.

Elyse: Where are the railroads getting their time from?



Michael: Increasingly railroads are getting their time from astronomers. They would often distribute it from an observatory to a jeweler and then the jeweler might even have a telegraph sending it somewhere else.

Elyse: I explain how Cherrie had told me her relative owned a jewelry store.

Michael: Early on jewelers are watchmakers. They want to show off their skills. The jeweler gets to say, this clock shows the most accurate time possible. So if you're walking along through the streets you check your watch against the jeweler and then you know you're in synch with the railroad. And so the jewelers were a very important as symbols of prestige but also sources for real accurate time signals.

Elyse: So if I wanted to find out how this clock was used to regulate time, where would you suggest I look?

Michael: I would want to look at the jewelry store itself.

Elyse: So it looks like Cherrie's relative John B. Mayo might hold the key. It takes a while, but I get lucky in the Cook County census records for 1870. Here's a John Brown Mayo. And it looks like he lived in Chicago and was a jeweler. He's our guy. According to the census, Mayo was English-born and worth a considerable \$30,000. And it seems that John B. Mayo & Company was located at an upscale hotel called the Palmer House. And here's a picture of the store. And this is exciting. Here's an article describing Mayo's old time clock. It says that it survived the Chicago fire which was 1871. But there is nothing about the clock regulating time through the railroads, or being connected to Western Union. I'm going to give this one more try. The largest railroad running through Chicago at the time was the Illinois Central Line. Railroad enthusiast Fred Ash has agreed to meet me at the Illinois Railway Museum in Union, Illinois.

Elyse: Fred, I know the date of the clock is about 1865 and I know it used to be in a jewelry store. But I'm trying to figure out how I can try to connect it to the railroad

Fred Ash: Well, the Illinois Central railroad started in 1850. And it was the longest railroad in the world at the time it was built and finished in about 1855. The railroad eventually bought a line that



went to New Orleans and that was really what they were known for, Chicago to New Orleans line. Timekeeping was very important on the railroad. Obviously you had a schedule that you had to keep to.

Elyse: How did the Illinois Central keep time?

Fred: There was a telegraph office in every station and every station had a regulator clock in their depot. And then each of the trainmen was required to purchase at their own expense a pocket watch which they would use on the trains and they would set it from the depot.

Elyse: How did they get their time?

Fred: Well, every day at 12 o'clock a message was sent out from the main office so that all the stations along the line synched their clocks so that they were all in agreement.

Elyse: And where were they getting their time from?

Fred: The master clock generally would have been working with a jeweler who really had the technology to maintain clocks to a very accurate level.

Elyse: So is there any way to connect our clock with the Illinois Central?

Fred: Well, when you called we actually did a little research and we found something that you might find of interest.

Elyse: It was a really fun investigation. I tell Cherrie how I was able to track down John B. Mayo and his jewelry store.

Cherrie: Oh! Wow. Mayo & Company Jewelers. Wow! Look at that.

Elyse: But the breakthrough came when I looked in to a possible railroad connection. Your clock was integral in the standardization of time. And I was actually able to find out its specific role.



Fred: What we found is a traveler's guide from the 1870's. And we have here a schedule from Chicago to New Orleans. And at the top of the schedule it says, "All trains on this road are run by the standard time of J. B. Mayo & Company Jewelers."

Elyse: Mayo would make his own solar observations, or get the time from Chicago's Dearborn Observatory, and synchronize his regulator accordingly.

Fred: So the clock at J. B. Mayo & Company would have been sent by telegraphic signal at noon to set every clock in every depot along the railroad and was used by most of the towns, at least in central Illinois and probably all the way to New Orleans. This was the heartbeat of the railroad. You know the kept time all along the railroad line and the communities along the railroad line depended upon this clock.

Cherrie: Oh my goodness. Look at that. That is amazing.

Elyse: So, J. B. Mayo wasn't only just a prominent jeweler, the hands of his clock reached all the way to New Orleans. World War I saw the standard time act of March 19, 1918, which codified the four zone system and instituted Daylight Savings Time in an effort to maximize daylight hours during the workday, thereby saving fuel. But that law was repealed after the war. Its use varied until 1966, when the federal government finally standardized the start and end dates of daylight savings time for the country. Today, international time is set using atomic clocks, which use atoms and molecules instead of pendulums and gears to take precise measurements of time. At the International Bureau of Weights and Measures near Paris, France, the time from hundreds of atomic clocks around the world is averaged to arrive at International Atomic Time.