Name: _____ Date: _____

A Practical Lamp, Not a First One

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Who invented the light bulb? The question has a confident answer, Thomas Edison, and the answer hides a problem. The word invented covers three separate claims: being the first to make a thread glow, making a lamp that lasts, and making one that can be sold and wired into a city. The National Park Service, which cares for Edison's laboratory, says plainly that Edison was not the inventor of the first bulb. What he and his Menlo Park team did was make the first practical incandescent lamp, which is a different and much larger achievement. Calling Edison the inventor of the first bulb is a shortcut, and the shortcut leaves out a long line of earlier work.

The record before him is crowded. Humphry Davy made platinum glow in the early 1800s, and in 1840 Warren de la Rue passed current through a coiled platinum filament in a vacuum tube. In 1841 an English inventor was granted a patent for a bulb that held platinum inside a vacuum. The metal was too costly for everyday use, so the idea stayed on paper. The lamps of that era glowed, but they faded fast and cost too much to sell. The Department of Energy puts the point simply: like all great inventions, the light bulb cannot be credited to one inventor, because it was a series of small improvements on earlier ideas.

Carbon looked more promising than platinum. Joseph Swan, an English chemist, had shown a lamp with a carbonized paper filament as early as 1860, and by the late 1870s he was getting excellent results with a carbonized cotton thread. In Russia, Alexander Lodygin had already made a bulb with carbon rods in 1872, many years before Edison's famous test in 1879. Swan lit his own house in 1880, and then London's Savoy Theatre in 1881, which became the first theater and the first public building lit entirely by electricity. Edison, then, was entering a field where the main ideas were already known, and the open question was who could make them work outside a laboratory.

Two engineering problems held everyone back: a vacuum pump good enough to take the air out of the glass, and a filament that did not burn up at once. Swan in 1878 and Edison in 1879 each solved them independently, and Edison's team built a better pump to clear out the air. Both problems had stalled commercial bulbs for decades. Edison's choice of target mattered just as much. He chose a filament material of higher resistance, which promoted economical distribution of power, and he modeled the whole network on the gas system, in which one central source sends fuel through pipes to many lamps. Swan was perfecting a lamp, while Edison was designing a service.

The Menlo Park laboratory was the first of its kind and the model for later research labs such as Bell Laboratories. It rested on a hard lesson. Edison's first patent, for an electric vote

recorder, was a commercial failure, and he resolved to invent only things he was certain the public would want. That vow shaped the lamp. John Kruesi designed the dynamo that the staff nicknamed the Long-Waisted Mary Ann. Accounts of the platinum hunt differ: one has the team trying carbon, then platinum, then carbon again, and another has platinum first and then carbon. All agree that carbon was the key choice. The National Park Service adds that the laboratory itself is sometimes considered Edison's greatest invention.

Why does the date of the first success keep changing from book to book? Charles Batchelor, the helper who had tested thousands of materials, wrote a notebook entry at nine in the morning on October 22, 1879, about experiments the day before. A magazine account of it reports a carbonized thread that glowed from 1:30 a.m. to 3:00 p.m. Older books give October 21 as the date of the triumph, yet the National Park Service says that date has been shown to be false. Sources put the burn at thirteen hours, or a little more. So the lamp glowed for at least thirteen hours in the fall of 1879. The exact night is lost.

The legal record is clearer, and it matters, because a patent was a promise of exclusive rights. Edison filed U.S. Patent No. 223,898 on November 4, 1879, and it was dated January 27, 1880. It described a carbon filament in a vacuum bulb. The Department of Energy notes a debate over whether his patents infringed those of William Sawyer and Albon Man in the United States and of Swan in England. The courtroom fights were settled in a practical way, by joining rival firms, and the company that made bulbs under the Sawyer-Man patent ended up in the same corporation as Edison's. In time his own name was finally dropped from that corporation.

A lamp is not a lighting system. When the Pearl Street station in lower Manhattan began serving customers in September 1882, its wires reached about a square mile, and no commercial station in the country had been built before it to feed incandescent lamps. A customer could not be billed for light without a meter to count it, so even the bill had to be invented. While his patent held, Edison supplied about 75 percent of American bulbs and often the power to light them. The station was a service, not just a lamp. Even so, adoption crawled, and by 1925 only about half of American homes had electric power, more than forty years after that first station.

Others kept improving it. In 1882 Lewis Latimer received U.S. Patent No. 252,386 for a way to manufacture carbon filaments, a patent that followed in the wake of Edison's invention and solved a different problem from inventing the lamp. Filaments had to be made again and again, bulb after bulb, so a better way to make them mattered about as much as a good design. Carbon stayed the standard for many years, until tungsten filaments came into use in 1904. The material changed, but the design did not: a thin thread, heated until it glowed, inside a sealed bulb. Between Edison's cotton thread and the tungsten wire lay a quarter century of quiet work.

The next step came in 1913, when Irving Langmuir found that an inert gas such as nitrogen inside the bulb doubled its efficiency, which means more light for the same power. Outside the glass, the Edison screw, now the standard socket fitting, let each improved bulb fit the same fixture. A new kind of bulb could be screwed into a socket that already hung on the wall, which is the quiet power of a standard. Each step kept the same basic design and made it cheaper to run or longer to last. The carbon thread that took Edison's team more than a year of failed work to find was a start, not an end.

Why, then, does Edison's name outlast Swan's? Part of the answer is probably that Edison sold a system, and a system is easier to remember than a component. Swan lit the Savoy Theatre, but Edison lit a district of New York. A name travels with the thing people can touch: a switch on a wall, a bulb in a socket, a station on a street. The question left open is how to divide credit when many people each supply a piece, and whether the person who assembles the whole belongs at the top of that list. If you had to name the inventor of the light bulb, whose name would you put first, and why?

Questions

1. What distinction does the first screen draw about the word invented?

A. It means only the first to try
B. It covers three separate claims
C. It always means the patent holder

2. Why was platinum a poor choice for homes?

A. It would not glow at all
B. It was too soft
C. It cost too much for everyday use

3. What two problems delayed commercial bulbs?

A. A good vacuum pump and an efficient filament
B. Wires and switches
C. Glass and paper

4. In this book, what does infringed mean?

A. Improved a design
B. Broke someone's patent rights
C. Bought a company

5. Why does the book say the exact night of the first success is lost?

A. Edison hid the notebook
B. No one saw the bulb
C. Sources disagree about the date and how long it burned

6. What does the author suggest may explain why Edison's name lasted?

A. He sold a whole system, not just a bulb

B. He lived longest

C. Swan gave up

Words to know

incandescent: glowing from heat

filament: glowing thread

carbonized: turned to carbon

vacuum: space without air

infringed: broke a patent

resistance: hindrance to current

Answer key: A Practical Lamp, Not a First One

1. B. It covers three separate claims
2. C. It cost too much for everyday use
3. A. A good vacuum pump and an efficient filament
4. B. Broke someone's patent rights
5. C. Sources disagree about the date and how long it burned
6. A. He sold a whole system, not just a bulb