Lighting It Up

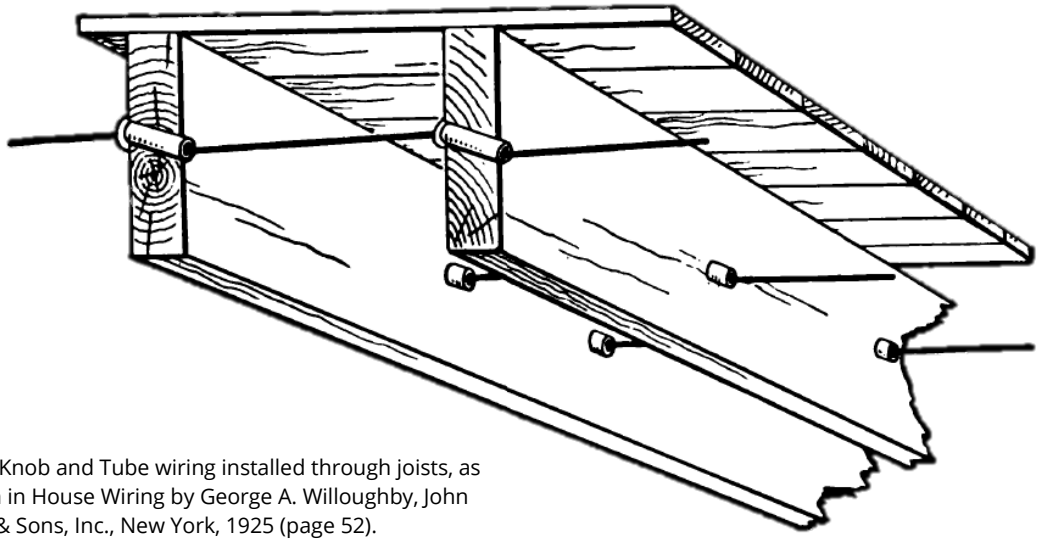
By Chad Slider, Assistant Director for Environmental Review
Indiana DNR Division of Historic Preservation & Archaeology

Good lighting is something that we now take for granted with nearly every home, business, school, and factory having cheap, reliable, and abundant artificial lighting at the ready. This is a relatively recent innovation in human history as this type of lighting has only been common in around the past 100 years. In prior centuries, all forms of artificial lighting were far inferior to natural daylight. Artificial lighting provided by burning candles, oil, and later kerosene and gas was inefficient, dangerous, and expensive.

Thomas Edison's perfection of an incandescent light bulb was considered a marvel of the late 19th and early 20th centuries, transforming how we lived and worked. Using electricity to light homes and businesses eliminated one of the principal causes of fires and other accidents. Electrical appliances would come later, as other uses for electricity were imagined. In addition to the first light bulb sockets and fixtures, electrical outlets were soon necessary for plugging in the various household appliances that began to appear in the 1910s and 20s such as fans, lamps, irons, toasters, hotplates, vacuum cleaners and later radios.

Early on, wiring for electricity used ceramic knobs and tubes to run separate wires for the hot and neutral. New construction and older buildings were frequently retrofitted for electricity.

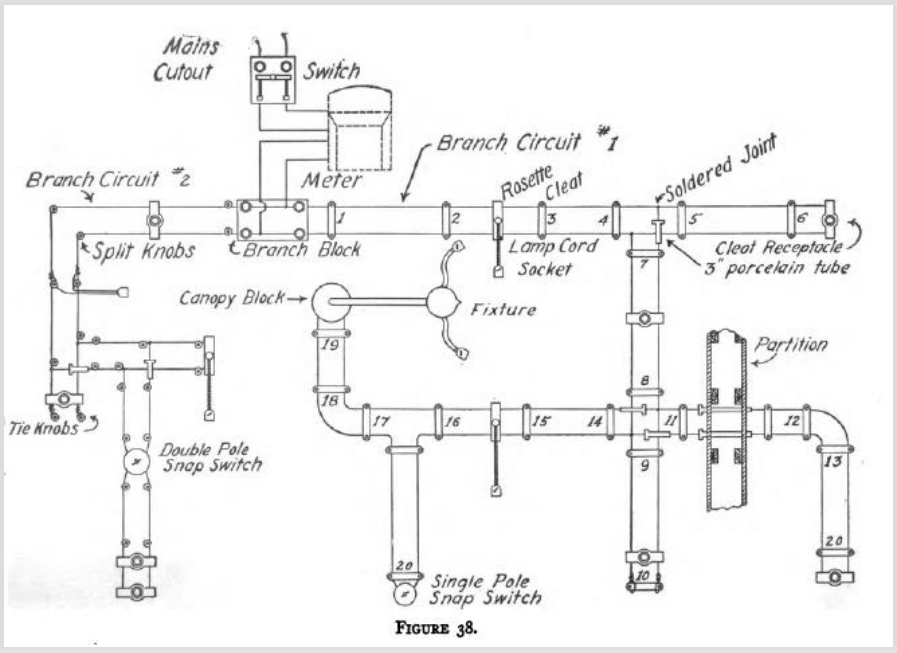
Above: Romanticized advertisement for electric table lamps from *Electrical Record,* October 1927, Vol. 42, No. 4, The Gage Publishing Co., Inc., New York (page 473).



Right: Knob and Tube wiring installed through joists, as shown in House Wiring by George A. Willoughby, John Wiley & Sons, Inc., New York, 1925 (page 52).

Plug cut-outs or fuses for circuits on a distribution panel were initially located in a convenient stairwell, hallway, or closet, generally in close proximity to the electrical main and meter. Some were simply installed flush on a wall, while others were placed within a box or cabinet. The earliest electrical distribution panels or boxes were often made of wood and contained fuses for the circuits. Later, these boxes were constructed of metal and eventually circuit breakers would supplant fuses to protect a circuit from overload and potential overheating.

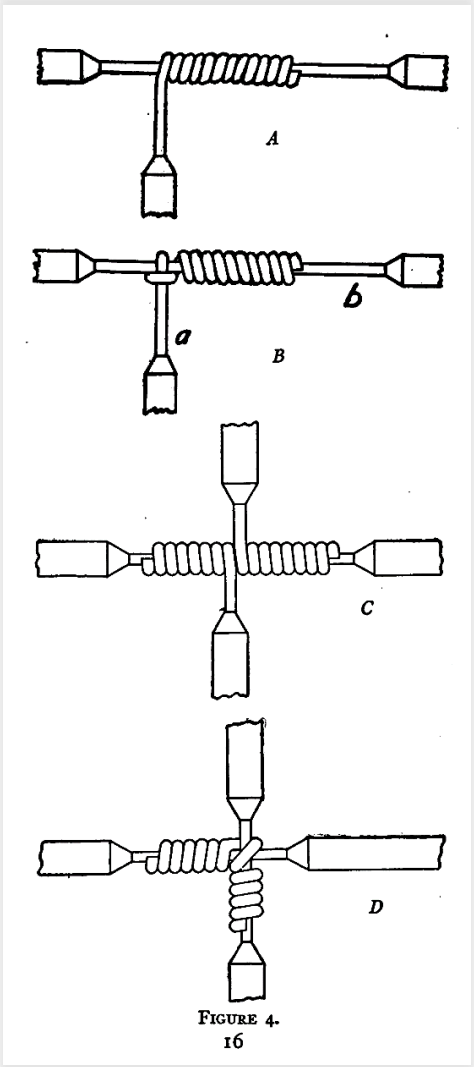
Above: Advertisement for fuse panel cabinets from *Electrical Record,* December 1927, Vol. XLII, No. 6 (page 52).



Above: Electrical diagram for open wiring using ceramic knobs and cleats, from Practical Electric Wiring by John MacLaren Sharp, D. Appleton and Company, New York, 1916 (page 60).

An inside wireman, or electrician as this tradesperson was later called, would determine the appropriate capacity and layout for electricity in a home or building. Branch lines were often run in a centralized location, with tap circuit splices tied in and split off from the branch line for light sockets and outlets. The work of wire joints and splices was particular. Those joints were meant to be soldiered and taped upon completion. Where the individual wires entered a fixture, socket, or switch, they would go through a circular loom or woven sheath to provide greater protection.

Flexible armored cable or BX wiring was an innovation where insulated hot and neutral wires were run together in a spiral metal sheathing. Later, non-metallic sheathed cable, known as NMC or Romex, was used in residential and some commercial buildings, largely supplanting knob and tube wiring before World War II. Combining the hot and neutral wires and eventually a ground wire within one cable became customary. It simplified the electrician's work and soon discontinued the practice of installing separate wires using knobs and tubes and splices, which required more time, planning and skill.



Above: Illustration of various wire joints for making a branch or tap-off from *Practical Electric Wiring* (page 16).

Above: Advertisement for Romex wire from Electrical Record, October 1927 (page 7).

The main issue with existing knob and tube wiring is the potential for electrical overloading. Originally this wiring was meant to primarily serve lighting needs. Then, other uses and demands upon a home's electrical system greatly increased the loads. Sometimes, as frequently blown fuses became an issue on an overloaded circuit, a higher capacity fuse was used to 'solve' the problem by allowing the circuit to carry a heavier load than it was designed to, creating a safety hazard. Early electrical wire used cloth, rubber and paper for insulation; these materials degrade and become brittle with age. Heat generated by conducting higher electric current accelerates the deterioration. The beneficial goal of improving the energy efficiency of older homes creates another potential risk, if unidentified knob and tube wiring exists within newly insulated walls or ceilings. Cavities containing knob and tube wiring, which were meant to remain open so any excess heat from wiring could quickly dissipate, are now filled. Overloaded circuits and wiring in direct contact with potentially flammable materials such as wood, paper, fabric, sawdust, and other fibrous materials used as insulation can become a concealed fire hazard. When making improvements to older buildings, it is especially important to investigate, understand, and consider all the existing assemblies and systems to assure that no harm is done and the work will add to the longevity of the structure and safety of its occupants. This is particularly important when dealing with antiquated electrical systems and knob and tube wiring.

It's interesting to recognize that homes and businesses began to have electricity installed more than 130 years ago. There are many buildings throughout Indiana where some of this early wiring can still be found. If you look around your historic building, up in the attic or down in the basement, you may find remnants of old wiring and electrical systems, such as ceramic knobs and tubes that have long since been abandoned but not removed or, in some cases, still in service after more than 100 years!

Above: Advertisement from *The Electrical Record,* December 1915, Volume XVII (page 77).