

principle of lighting by electricity. Electric arc lamps were in use in many localities and a number of scientists, not only in America but abroad, had for years been attempting to "subdivide" the electric arc. Each had met obstacles which they could not overcome and had given up. Edison studied their results and set to work to solve the problem. He concluded that an incandescent "burner" operating in a vacuum was the logical solution. A perfect vacuum could not be obtained with the existing equipment, so he perfected five patents on the mercury pump in order to obtain a better vacuum. This solved, he turned his attention to the "burner" or the filament as we know it. He first tried heating various metals to incandescence, but when hot enough to produce light, they melted. So he set out to find more suitable substances. According to the testimony in his laboratory notebooks, still in existence, he actually tried out more than 1,600 substances to find a substitute for metal, all without success. Reviewing his laboratory notes, he concluded that the most likely substance tried were the carbons. So he set about carbonizing every material he could find.

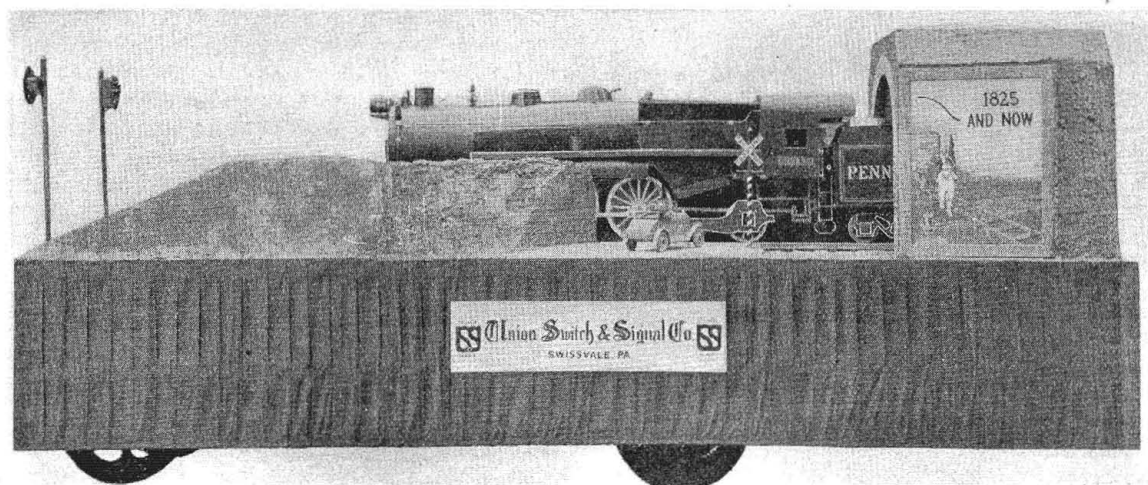
Paper, fabrics, wood and every material which could be carbonized were tried. More than 6,000 separate experiments were conducted in this search to find a substance which would give the desired result. Cotton thread seemed to be a likely material, and Edison sent out for a spool of heavy cotton thread and with one assistant worked for two days and two nights attempting to carbonize a two-inch piece of cotton thread and insert it in a bulb. Usually the fragile carbon broke before it could be taken from the mold. Sometimes they would be broken by merely breathing on them. Three times, pieces were successfully inserted in the bulb only to break before the electricity could be turned on. Finally a piece was inserted and when the electricity was sent through it, the filament glowed and continued to burn for 40 hr.

This was the world's first successful incandescent lamp. But Edison did not consider his task completed. He had to find a more rugged, more efficient filament. Carbonized paper was tried with fair suc-

cess. One day he happened to try a piece of fabric taken from the rim of a bamboo fan. The result was better, but not entirely satisfactory. Edison immediately dispatched five men to all the corners of the world to send him samples of bamboo fibre. One went to India, one to Cuba, one to Japan and one to the Amazonian jungles of South America. These men sent in thousands of bamboo fibres, each of which was carbonized, inserted in a bulb and tried out. The best sample came from Japan and for several years lamps were made from bamboo fibre grown in Japan.

Edison was still not satisfied, and continued improving his lamp until he had perfected a plan of squirting carbon in solution through a die and then baking out the moisture so as to leave a wire-like filament. These carbon lamps served for all commercial incandescent lighting until about 1900. Of course, Edison's lamp has been further improved since by other men. Upon the discovery of a process for drawing the non-ductile metal tungsten by Dr. Coolidge, lamp manufacturers went back to metal filaments and we have today incandescent lamps which give us 76 times more light for each electrical unit than Edison's first lamp produced. But the modern incandescent lamp is Edison's invention, and to him belongs all the credit.

Of course man had artificial light before Edison's lamp. The history of light is a long and interesting one. At the beginning of recorded history, the more progressive humans used the burning fagot or torch for artificial illumination. Thousands of years later they burned animal fats in a shallow dish with porous wick, the lamp of the Roman period. Fifteen hundred years later mankind used the tallow candle which served our forefathers. In about 1850 the kerosene or coal or oil lamp was invented and this was the principal source of artificial illumination until 1879. Prior to Edison's lamp, all artificial illumination was obtained through a flickering flame accompanied by smoke. Edison gave the world a bright, clean, steady, safe and cheap light. His creation has been of immense economic importance to human kind.



#### The Best Is No Better Than the Worst—Therefore Cross Crossings Cautiously

Light's Golden Jubilee was observed in Pittsburgh, Pa., on the evening of October 23, a part of the celebration being the Pageant of Light, a parade of about 100 floats. The Union Switch & Signal Company was represented by a float explaining highway-railroad crossing protection. A large picture showed the protection afforded in 1825, a man on horseback preceding the train, while an exact model on the scale of 1 to 4 represented modern practice.

The entire float depicted a train leaving a tunnel and passing through a low cut—the highway crossing being located between the tunnel and the cut. Smoke was pouring out of the stack, the bell was ringing and an air whistle was blown when approaching a street intersection. The signals showed the proper indications, the head-light was burning and green classification lights, representing the first section, were also burning on each side of the head-light. The highway crossing signals were giving their indications by the flashing lights. Head-lights and tail-lights were burning on the automobile as it stood at the crossing.