THE ELECTRIC LIGHT IN HOUSES.

Some years ago the famous Baron Munchausen took a trip to the moon. At the time the object of his excursion was unknown, but it is now supposed to have been taken on behalf of an electric lighting company, to discover how the soft white light of the heavenly orb was produced; whether, for instance, the light was supplied from dynamos in the geographical centre of the moon, whether the current could be so equalized that dynamos at any point could supply the body at all points with an equal light, and whether the current could be subdivided or not. As the Baron in his interesting and extensive account of his tour does not touch upon these matters, it may be presumed that his mission was a failure. At any rate nothing came of it, and it was reserved for Mr. *Edison* to evolve without a lunary excursion a method of producing artificially that soft white light which has furnished a theme for so many poets; so that the poets of the future will soon be able to get up a little private moon, each for himself, and to apostrophize, even when the heavens without are overcast, the silver rays as they come dancing over a basin of water—though it is to be devoutly hoped that the number of poets will not increase with the number of electric lights.

Mr. *Edison's* invention naturally met with much opposition, and though the opposition has diminished considerably, there are still many who refuse to put faith in the system. They fear that the electric light, like the moon it resembles, will prove “false and inconstant.” The first lot of doubters, who did not believe that Mr. *Edison* could subdivide the current into small lights, were silenced some time ago by the actual subdivision, and soon the inventor proposes to illustrate to us the practicability of his system by illuminating the streets and houses in about a square mile of our city—that part bounded by Wall, Spruce, and Nassau streets, and the East River. In England the system has already been tested. Mr. *Edison* runs a current from what is known as the Holborn Viaduct Station, and illuminates, among other buildings, Dr. *Parker's* Temple, and part of the London General Post-office. Besides, the Scala Theatre in Milan, a portion of the Strasburg dépôt, and two steam-ships of the Oregon Navigation Company are lighted by Mr. *Edison's* system.

Yet it is natural that the inventor should meet with considerable opposition. The introduction of gas was at first violently opposed; and now that gas is generally in use, it in turn opposes the introduction of the electric light. How strong that opposition is, may be judged from the money power at its back. It is computed that about one thousand millions of dollars are invested in gas all the world over. Of this amount about three hundred and eighty-five millions are invested in the United States, and about four hundred and five millions in England.

In selecting the down-town district for the first experiment on a large scale in this country, Mr. *Edison* had in view the fact that besides the large consumption of gas in this district, there is a good deal of steam motor power employed, which the Edison Electric Lighting Company propose to supplant by electric motor power from the same current which supplies the light. A careful preliminary canvass of this district gave the following statistics: There are in the district 18,043 gas jets, burning between five and six in the evening; 129 steam-engines, aggregating 2388-horse-power; 742 hoists and 90 elevators, and 80 sewing-machines. Besides, the canvass elicited the interesting fact that live horse-power is used in the leather manufactories in the Swamp. Eighty horses tramp over treadles in the top stories of buildings. Some of these horses are kept there from the time they are taken up until they die.

A canvass of the Madison Square district, bounded by Twenty-fourth and Thirty-eighth streets and the Eighth and Madison avenues, where work will soon begin, elicited facts which are interesting when contrasted with the statistics of the first district. There are in the houses 41,000 gas jets, seventeen buildings (hotels and theatres) burning over 500 gas jets each; 52 steam-engines, aggregating 1453-horse-power; only 3 hoists, and 14 elevators; 220 pumps; and 2284 sewing-machines. The buildings where the most sewing-machines are found contain the fewest gas jets.

In regard to using the current for motor power, we quote Mr. *Edison* himself. “We can,” he said, “subdivide the electric motor down to one-hundredth of a horse-power. To run a sewing-machine takes the same amount of electricity as is required to run a lamp of sixteen-candle-power—the ordinary lamp. We can run a sewing-machine all day long at a cost to the consumer of five cents. There are in New York some 240,000 sewing-machines, and there is no reason why we should not supply power to run most of these.”

The streets in the down-town district require thirteen miles of pipe. The Madison Square district embraces 185 acres, or forty-seven blocks, aggregating in length about 45,000 feet. As the pipe in this district will be laid on both sides of the street, about 90,000 feet of pipe will be required.

The central station of the down-town district is located at Nos. 255 and 257 Pearl Street. Much work was required before the building was ready for the plant. This consists of six dynamos, and six engines to run the dynamos, and includes incidentally four boilers, with an aggregate capacity of 1000-horse-power, boiler fittings, two large smoke-stacks, steam conveyers for coal and ashes, shafting, blowers, and the pumping and blowing apparatus. The placing of these requires vaults under the sidewalk, and a two-story iron framework resting on a strong bed of masonry and concrete. Each of the six engines has a normal capacity of 125-horse-power, and a maximum capacity of 200-horse-power, making a total maximum capacity of 1200-horse-power. A dynamo like the six used in this structure weights thirty tons, so that the weight of the six is 180 tons.

The weight of the frame structure and electrical apparatus will be about 500,000 pounds, which is distributed so as to average only about 200 pounds per square foot of structure. The boilers, when under full headway, will consume 1680 tons of coal and 4,200,000 gallons of water per annum, equivalent to a daily consumption of about five tons of coal and 11,500 gallons of water.

A full description of the dynamos belongs to strictly scientific periodicals, and would fail to give an intelligent idea of the machines to any one but an expert. They consist in the main of powerful electro-magnets, between the poles of which an armature or inducing coil is revolved by the steam-engine. From the armature the electric current flows through the conductors in the pipe laid in the street as water flows through a main, and similarly it flows from whatever point the pipes are tapped into the houses. The strength of the current can be regulated according to the amount of work required of it at any moment, so that there will be no waste of power or material. A regulator, namely, by varying the resistance of the circuit of the dynamo's field magnets, weakens or strengthens the current induced in the armature. An electro-motive-force indicator shows instantly any variation of the current produced by the turning on or extinguishing of any number of lights in the circuit. A supplementary indication is shown in the burning of a number of “pilot lights” in the regulating room.

The laying of the pipes and incidentals form an interesting and popular feature of the work. The writer remembers how much curiosity was excited early in October last by the queer-looking pipes and boxes that were being piled up on the sidewalks of Gold, Spruce, and William streets. Walking down Spruce Street one day he saw a number of people gathered at the corner of Spruce and William streets looking into a hole. In the hole a few feet below the surface was an iron box, which was regarded with much curiosity. But there was no one to explain the raison d'être either of the hole or of the box. Soon some men came along and began filling up the hole, but they had no information to give. Looking down Spruce Street, though, the writer saw that digging was going on in Gold Street. As he neared the spot he saw boxes similar to that in the hole on William Street piled up on the sidewalk. The roadway on either side was dug up a few feet below the surface. A man was skipping about in the ditch with a tape measure, and several others were carrying small iron pipes, from which two thick pieces of metal projected. When an iron pipe was laid and measured, one of the mysterious boxes was lifted into the ditch. The writer was told that the Edison Electric Light Company were laying pipes from which wires were to be led into the houses and business places of a portion of the city bounded by Nassau, Wall, and Spruce streets and the East River; and that Mr. *Dodge*, one of the engineers of the company, could explain the process.

According to Mr. *Dodge*, the pipes are ordinary iron pipes which incase thick copper wire—the metal seen projecting from the pipes lying on the sidewalk—separated from the iron by an insulating substance. Five kinds of boxes, not differing much in size, are used. They are about a foot long, six inches wide, and made of iron. They are respectively junction boxes, coupling boxes, service boxes, and safety boxes, and a combination of the coupling and service boxes. The simplest of these is the coupling box, in which the connection between two pipes is made. The pipes rest on sections cut into the sides of the box, the pieces of metal projecting from either pipe being connected by clamps. The box is then filled up with a molten insulating fluid, which cools into a solid. Then the lid of the box is closed. The combination coupling and service boxes have in addition to the regular two sections a third, through which the wires are "served" into the houses.

The safety box is an ingenious contrivance to prevent danger from the heat caused by accidental crossing of the wires. The principle on which it works is as follows: Should wires cross by accident, the damage caused by the ensuing heat would be considerable. In the safety box the lines of copper wire are interrupted by lead. Almost instantaneously with the crossing of wires, the heat runs along to the lead and melts it. Thus the circuit is broken, and the danger averted. These boxes are on the corner of every street, and open from the sidewalk, and an inspection of them shows whether or not the wires along the block are in good condition. Through the junction boxes the lines cross at the corners.

The lamps in which the wires terminate are the Edison Incandescent Lamps. Each consists of a pear-shaped globe about four and a half inches in height, exhausted of air, into which is sealed a filament of carbonized bamboo slightly thicker than a horse-hair. This filament becomes incandescent when the electricity passes through it, and emits a soft white light. The lamp is screwed into a socket, which is permanently attached to a chandelier or bracket of a shape or size to suit individual fancies. The lamp, once screwed into the socket, needs no further attention or care until the carbon breaks. Then in a few seconds it is unscrewed and replaced by a new lamp. When a lamp breaks, the inrush of air at once extinguishes the carbon filament, so that if the lamp were wrapped in paper, this would not be ignited. Mr. *Edison* says he would be willing to break one of his lamps in the middle of a barrel of gunpowder. Each is turned on or off by a key, and is perfectly independent of the others, so that lights may be controlled singly, in pairs, or in groups of any desired number. In order to ascertain the average “life” of sixteen-candle lamps, ten selected at random were set burning on April 18, 1881. One of them burned until the following 7th of December, at 3.30 P.M., or 3186 hours and 41 minutes. The average life was 1425 hours. A year before that Mr. *Edison* could not get his lamps to last on an average longer than 600 hours. He expects to make further improvements in them.

A popular feature of the system will be a meter which will measure the quantity of electricity consumed by each consumer, and which is so simple that the customer himself can check off the company's bills. The London *Times* describes this meter as "a bottle containing two plates of zinc in a solution of zinc sulphate, the current in passing causing the one plate to increase in weight at the expense of the other. As, however, if the whole current passed through the bottle, this change would go on too rapidly, a properly proportioned shunt wire allows just 1/870 of the electricity going into the house main to pass through the meter. The estimate of the quantity consumed is made once a quarter, or as often as may be convenient, by weighting the plates in the bottle, a second bottle being supplied, the plates of which the consumer may weigh for himself as a check upon the company."

The straightforward, quiet, business-like method with which the company's work is being pushed is due to the vice-president, Major S. B. *Eaton*, who has complete and thorough superintendence of the illuminating system. Mr. *Edison* has calculated that 800,000 gas jets are now burned in New York City. All these he hopes some day to supplant with electric lamps.