THE FIRST ELECTRIC LAMPS.

There seems to be little doubt but that Professor Moses G. Farmer, at present connected with the torpedo station at Newport, was the first to make successful experiments with the electric light in this country, and that his discovery dates as far back as 1859. A correspondent of the New York *World* communicates to that paper a recent interview with Professor Farmer, which he commences with the following extract of a letter, written by the Professor some time since to a gentleman in Salem, Mass.:

"Some few of the citizens of Salem (among them ex-Mayor Williams, Mr. George D. Phippen, Mr. J. H. Phippen, and perhaps others) will doubtless recollect a parlor at No. 11 Pearl street, Salem, Mass., which was lighted every evening during the month of July, 1859, by the electric light, and this electric light was subdivided too! This was nineteen years ago, and it was undoubtedly the first private dwelling house ever lighted by electricity. A galvanic battery of some three dozen six-gallon jars was placed in the cellar of the house, and it furnished the electric current, which was conveyed by suitable conducting wires to the mantelpiece of the parlor, where were located two electric lamps on each end of the mantelpiece. (I would not wonder if the screw holes were there at this day.) Either lamp could be lighted at pleasure or both at once by simply turning a little button to the right for a light, to the left for a dark. No matches, no danger, no care to the household, nor to any one except to the man who attended to the battery. The light was noticed as being soft, mild, agreeable to the eye, and more delightful to read or sew by than any light ever seen before. Its use was discontinued at that time for the simple reason that the acids and zinc consumed in the battery made the light cost about four times as much as an equivalent amount of gas light."

Professor Farmer was requested to give his views—first, upon the gas company scare; second, as to the merits of the electric light; third, regarding the mode of conducting it through the public streets; fourth, as to its cost; fifth, regarding the production of electricity.

Speaking of the scare in the gas stock market, the Professor said he thought it was certainly premature, for at present there was not more than one hundred electric lights in practical use throughout the land, and, compared with the number required for the illumination of the country, they were as nothing. "Suppose," said he, "you wanted to give light to the citizens of New York, each one requiring equal to a 10-foot gas burner. Reckoning on the basis of 1,000,000 people you would want 10,000,000 candle lights. If you wanted it divided up into small lights you could not expect to get more than 500 candles per horse power, and that would require at least 20,000 horse power to light the city. In order to accomplish this there would have to be made machines, steam engines (to a large extent purposely for it), magneto-electric machines to furnish the electricity, and it would not be advisable to have them average more than 5,000 candles each for fear of getting out of repair. That would require 2,000 magneto-electric machines, which could not be produced in a moment. It would perhaps be desirable to have 5 electric lamps to each machine, and that would require at least 20,000 lamps.

"While some of the manufacturers are prepared to supply in a certain time their particular style of lamp, yet the public has not decided which is the best to use. No lamp at present in use has such manifest superiority that every person will buy that particular one. None at present in use is properly adapted to minute and profitable subdivision of the electric light. This is an entirely different condition of things to gas illumination, in that factories already exist, and the means of supplying gas fixtures, tubing and piping. Gas pipes are already laid in the streets, which would be utterly worthless for the distribution of electricity for the purposes of the electric light, and while competent electrical engineers are sufficiently well acquainted, theoretically and practically, with the distribution of electricity for telegraphic purposes, yet a distinct branch of electrical engineering science needs to be inaugurated and carefully studied before any expensive system of electric distribution should be entered upon; and although I expect to see the electric light widely introduced, and that very soon, yet I do not conceive that it is going to supplant and displace, to a very large extent, the consumption of gas immediately. But it may and doubtless will have the effect to stimulate and hasten the use of gas for heating purposes as well as those for illumination, and so I expect the consumption of gas to increase rather than decrease after the effect of the scare is over. I venture the opinion that in five years from now there will be more gas consumed than there is to-day, proportionately also with the increase of the population. One of the effects of the introduction of the electric light for the purpose of illumination will be the stimulating inventors to produce apparatus for the consumption of gas for heating purposes."

Touching the merits of the electric light, Professor Farmer said it would eventually approximate the quality of daylight for the display of goods and merchandise in warehouses. It would be vastly superior to gas for the illumination of workshops and manufactories, for with the same expenditure a better and greater diffusion of light would be obtained. He considered a room fairly lighted that has one candlelight to 125 cubic feet of space, very well lighted with one candle to 75 cubic feet of space, but with the electric light properly distributed it would be easy to have one candlelight to each forty or fifty cubic feet of space, and this would be accounted a very brilliant illumination. The light, he thought, would render great service in the mining regions, lessen the expense and diminish the dangers. It will render it perfectly feasible to carry on great enterprises by night as well as by day, such as tunnels, bridges, and constructive operations in general, and prove useful for billiard halls, which are lighted with difficulty by gas, and if necessary great agricultural operations could be carried on by night at profitable expense in harvest time. The lighting of streets and other public thoroughfares will be accomplished satisfactorily and at much less expense than the present mode of lighting by gas, and so there would be more illumination for less money; and a good street lamp at night is preferable to a policeman.

With reference to the mode of conducting electricity through the streets, the Professor said that copper wire was the cheapest conductor, and so will be universally used. The best mode of insulating wires underground for conducting electricity for electric illumination was as yet undeveloped, and will need careful investigation, because the frequent accidents to which subterranean wires are exposed will necessitate the having of a corps of electrical engineers for this special occupation or art, for while it is somewhat of the same character as conducting electricity for telegraphic purposes, still the conditions would be that of another department.

Regarding the cost where power is already in use for manufacturing purposes, and where there is an available surplus and it can be used for the production of the electric light, as at Fall River, Providence, Lowell, Manchester, Nashua, Cohoes (N. Y.), and multitudes of other places, the electric light can be furnished very much cheaper than gas is at present supplied, perhaps for from one quarter to a half the cost. There are two elements that enter into the cost of the electric light—the cost of the power consumed in producing it, which costs only when used, and the cost of interest on the plant, which is as great when not in use, for it, like a blister, draws all night long. So if the light is only to be used for an hour or two the cost of interest and depreciation might exceed the cost of the power consumed. For instance, the horse power in some cases could be furnished at $70 per year, while the interest and depreciation on a 5,000 candle machine might cost as much more. So if the light is to be used but a small portion of the time, it would be relatively considerably more expensive than if required to be used all the time. The cotton manufactory would be at one extreme and the coal mine at the other.

Of the production of electricity, Mr. Farmer said that it cannot be stored and the storehouse drawn on at pleasure. It must be produced as and when wanted. The electricity for the purpose of illumination is produced by the movement of coils of copper wire in the neighborhood of magnets. Electricity is developed in condition whenever it is moved across the lines of force streaming from a magnet. The electricity is more powerful the more rapid this motion; more powerful the longer the wire, and more powerful the greater the intensity of magnetism in the magnet. These are the fundamental facts that underlie the construction of all magneto-electric machines. Any more technical description of the process of producing electricity would scarcely be understood by the general reader. In concluding the interview, Mr. Farmer said: "While our gas stocks have depreciated, and may not, possibly, return to their former value, I do not look to see the companies cease to pay good, fat dividends."

AMERICAN INDUSTRIES.—No. 1.

BY HAMILTON S. WICKS.

It is proposed, in this series of articles, to give a concise and intelligent description of the leading industries of this continent. Those situated near, and holding immediate relation with the commerce of the metropolis, will be first considered. Just opposite this city, and immediately dependent on it, lies Jersey city, a workshop of the metropolis of no little importance. Its shipping interests are large, and it is the site of such extensive manufacturing industries as Lorillard's Tobacco Works, The Dixon Crucible Co., Colgate's Soap Works, extensive sugar refineries, iron and steel works, etc. etc.

The first of these industries we illustrate and describe is the Lorillard Tobacco and Snuff Manufactory, and an engraving illustrating some of the processes is shown on the first page.

HOW TOBACCO AND SNUFF ARE MADE.

Since the reign of William III. of England the use of tobacco has become a universal custom throughout the civilized world, although long before his time it had been used quite extensively, having been originally introduced to the attention of European colonists by the Aborigines of this country. Many of the most profound thinkers have been inveterate smokers, chewers, and snuffers; and not a few have lived to an advanced old age with the pipe, snuff and tobacco box as their constant companions.

The tobacco industry of America is a very important one. It utilizes the soil of large tracts of land in many Southern and Western States. It gives employment to hundreds of thousands of people, both in the field and in the factories. It interests large aggregations of capital, and pays into the national treasury fully 34 per cent of the internal revenue.

For the full illustration of this industry it would be necessary to visit some of the quaint villages of Virginia and Kentucky, such as Lynchburg or Henderson, where about this season of the year the planters bring in to market their wagon loads of tobacco leaf, where the speculators or "pinhookers" (as they are called) barter with them for its sale in lump, and where the old time negroes stationed on every corner with long "tobacco horns" call the merchants to the commission sales at the different warerooms. This portion of the industry, as well as the tedious culture of the leaf on the plantations, is merely initiatory, though none the less interesting and useful. The most complicated, and also very interesting and important part of the industry is the manufacturing of the leaf into the various grades of chewing, smoking, and snuffing tobacco that the market demands.

The illustrations on the first page of interior views of P. Lorillard's extensive tobacco factory will prove interesting, as showing the different processes of manufacture. The reader must understand that the leaf used in large manufactories is selected with the greatest care by experts, who determine by the color and smell the quality requisite for any particular grade. The manufacture of plug tobacco is the most extensive in the Lorillard establishment. The machine in the illustration entitled "Rolling the Lumps," is the plug making machine, one of the most ingenious machines known to the trade and wholly controlled by the firm. After it has been sweetened, flavored, and dried the leaf is fed into this machine as "fillers." Being placed as evenly as possible in the long trough by girls it is pressed and cut into the exact size of plugs required by the wonderful automatic action of the machine. The illustrations showing the method of "Covering Lumps" and the "Pressing" give very accurate ideas of those processes. Each plug is weighed after coming from the plug machine, and a standard weight is obtained by taking from or adding to each before covering them. A broad handsome leaf is now wrapped by expert hands about the plug, and it is ready for the pressing room. Here the plugs are put into smooth iron "cells" within a large frame and submitted to powerful hydraulic pressure for several hours. A finishing pressure is afterward given them in another set of hydraulic presses called "pots." Each plug is stamped with the Lorillard tin tag, which is a guarantee of its genuineness.

For the manufacture of fine-cut chewing tobacco the same care in selecting the leaf is exercised as in the plug. The "Dipping of the Leaf" is shown in the illustration; a solution of licorice and sugar, etc., being used for the purpose, and on this and the quality of the leaf depends the character of the tobacco. After stemming the leaf, it is taken to the cutting room, shown in the illustration entitled "Making Fine-cut." Here it is arranged in a trough and forced by the endless chain through a small square aperture, where it is cut into long silken threads by a powerful knife, which makes 1,200 revolutions per minute. All that now remains is to dry and prepare it for the market. Smoking tobacco is similarly made.

In the manufacture of snuff time is required. The process of fermentation lasts from six months to a year or more. Before going into the grinding mills, shown in the illustration, it is thoroughly cured, and after being ground and before it is filled into the bladders for sale it is again cured, until its fragrance and mildness are of the most approved quality. The factories of the Lorillard tobacco works occupy a full block, 405 feet in length and 210 feet in width, in Jersey City, N. J., and bounded by Washington, Warren, Bay, and First streets, and nearly the whole of another block in addition. The house has an age of 118 years, having been originally founded in 1760 by Pierre Lorillard, a French Huguenot. In the year 1870 the present firm took control of affairs, with Mr. Charles Siedler as general partner. The factory in Jersey City as it now stands was erected in 1875, and is the largest institution of the kind in the world. Last year the sale of plug tobacco exceeded 10,000,000 pounds. Of tobacco and snuff the sales aggregated more than 14,000,000 pounds, and $3,500,000 revenue tax was paid to the Government. There is no State in the Union, with the exception of Virginia, that made such a good show either in the manufacturing of tobacco or the tax paid as this one house. An army of over 2,500 men, boys, women, and girls is kept constantly employed. About $14,000 is dispensed weekly for the labor, and it would amount to a calamity to these people if such an institution were to cease its operations from any cause even temporarily.

PATENT OFFICE PRACTICE.

Commissioner Paine announces that hereafter letters patent and certificates of registration will be perfected and ready for delivery upon the day of their date. The last issue, under the rule heretofore existing, will bear date of December 17, 1878. Then there will be a hiatus until January 7, 1879, on which day, and subsequently, patents and certificates will be deliverable as soon as signed.

The *Official Gazette* of even date with the weekly issue will continue the usual announcements respecting the perfected patents and certificates of that date, but no information, either by *Gazette* or otherwise, will be given as to any pending case about to issue, except to the party in interest, until such case has been finally signed and sealed.

A NOVEL thermoscope and hydroscope, the invention of Col. Aristide Gerard, has recently been patented both in this country and in Europe, and is controlled by the Automatic Safety Company, of No. 40 Charles street, New Orleans, La. This invention is designed for the speedy detection of abnormal heat or water in steamers and other vessels, and is said to be very effective.

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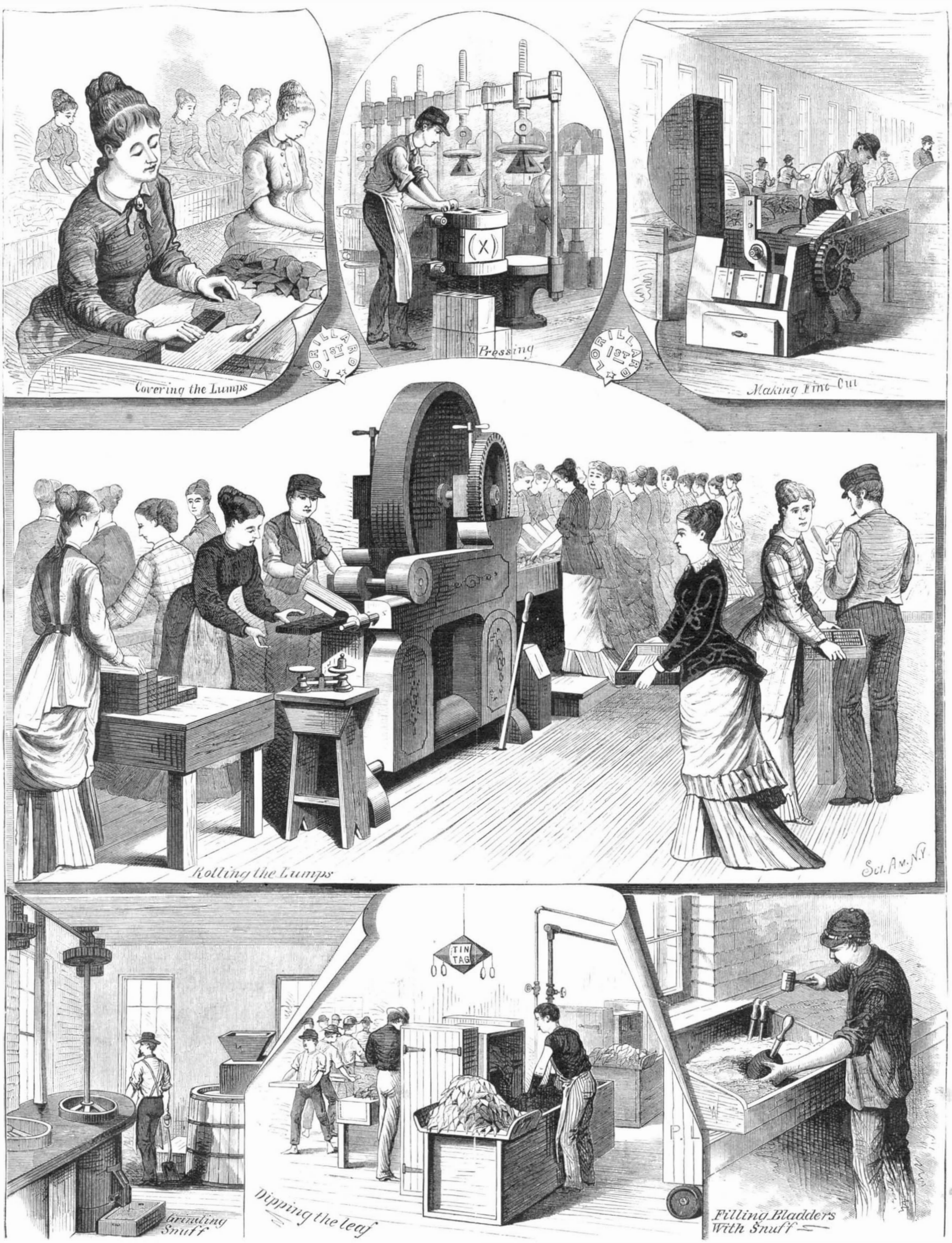

LORILLARD'S TOBACCO FACTORY.—[See page 17.]