THE EASTERN POWER STATION OF THE BROOKLYN CITY RAILROAD COMPANY.

The eastern power station of the Brooklyn City Railroad Company may be taken as an example of as close an approach to the perfect type of an electric generating plant as has yet been produced. In its intricate connection of parts it is most ingeniously arranged, and every appliance used with it embodies the most recent improvements. It supplies electric power for many miles of trolley road in the city of Brooklyn. Like all modern electric generating stations, it has a steam plant of the most perfect description for keeping an exact watch of the results obtained in the development of mechanical energy. The conversion of mechanical into electrical energy is effected by dynamos, which, with the comparatively simple switches and safety cut-outs required, constitute the electrical parts of the installation. The works are situated on the corner of Kent and Division Avenues, Brooklyn, E. D., on the banks of the East River. In the cuts we illustrate the dynamos and engines, which portions of the plant are accordingly to be described first. The complete station calls for six engines and dynamos; at present four of each are in place. Each engine is of the cross compound type, the high and low pressure cylinders being respectively 32 and 62 inches diameter, with 5 feet stroke. They run at a speed of 75 revolutions per minute. The flywheels, which are put together in sections, weigh 70 tons each, and each engine shaft, which extends from engine to engine and carries also the dynamo armature, weighs 56 tons. The journal portion of the shaft alone is 4 feet long and 2 feet in diameter. The normal horse power of an engine is 2,500. The steam connections of the different engines are so arranged that they can be run in any desired way; a single cylinder of either the high or low pressure size may be operated alone, either with or without condensing; or, as in the usual course of things, both cylinders may be worked in succession on the compound basis. Two governors are mounted on each engine; the low pressure governor regulates the speed; the high pressure governor is a safety device and has no effect upon the engine until a certain speed, set as a safe one, is exceeded, when it operates a throttle valve and cuts off the supply of steam, bringing the engine to a dead stop.

The engines are supplied with oil through pipes by the Anderson automatic lubricating system. Under a 15 pound head, oil passes through pipes to all the journals of the engine, and in addition a supplementary set of pipes is employed to feed water to the different parts, if such should be required as an adjunct to lubricating or to cooling the parts. The oil and water before use are carefully purified.

Each shaft is provided with wedges operated by screws accessible when the engine is running. By these the shaft can be shifted vertically or horizontally, so as to keep the armature perfectly centered in the field. The dynamos, each of 1,500 kilowatts capacity and 500 volts potential, are of the well known multipolar type of the General Electric Company. Each dynamo has twelve pole pieces, and the current is taken from the armature by twelve carbon brushes. As at present organized, the maximum current given by the station is 5,600 amperes, the station having a capacity of 800 cars. While we only illustrate the engines and dynamos of this station, the steam generating plant is itself an object of great interest, with its many connections. Twenty-four Babcock & Wilcox tubular boilers, distributed over two floors, are used. Eventually, thirty-six—eighteen on each floor—will be introduced. These boilers are fitted for natural or artificial draught. The natural draught is maintained by a brick chimney 296 feet high, with a 17 foot shaft. Two 12 foot Sturtevant blowers are connected to a great nozzle in the base of the chimney, by which induced draught may be supplied. The steam is delivered to the engine by a 20 inch steel, flange-jointed main. Wheeler's surface condensers are supplied for the engines. The feed water pipes, whose main line is 8 inches in diameter, are all of cast brass or of high grade mandrel-drawn brass pipe. Worthington pumps are used for the water supply. Green fuel economizers utilize the waste heat from the products of combustion for heating the feed water. A system of thermometers and pyrometers is connected with the draught flues and chimney, so that an accurate watch can be kept upon the operation of the economizers, so as to get the maximum economy from them without interfering with the draught. A roof coal pocket of 6,000 tons capacity contains the coal. This coal is distributed to the boilers by weighing tubes supplied by the Howe Scale Company.

The Scuppernong.

A correspondent of the Country Gentleman speaks of a Scuppernong grape vine from which forty bushels of grapes have been sold for two successive years, and it is probable that it will produce fifty bushels this year. The vine is trained over an arbor some 25 feet long by 18 feet wide, and is a foot in diameter at the ground. This is not at all an uncommon size, and a vine might easily cover an area of 2,000 square feet. The Scuppernong will not thrive north of 37° of latitude, but it is well known as thick-skinned grape which keeps well and can be shipped long distances. It has a peculiar flavor, which is not diagreeable to many people, and it makes an acceptable wine. It reaches its best development in southeastern Virginia and northeastern Carolina, where it runs wild and often climbs 40 feet or more into tree tops. If allowed to grow with no pruning or care, except a trellis or something to run upon, it will usually give fair crops.

The Sun and Its Flames.

The present state of the science of the sun, upon whose rays our whole life is dependent, is summed up by Mr. Camille Flammarion in the last number of Astronomie. The sun, as we know, is just at present occupying the entire attention of astronomers. Its spots, which are becoming more and more manifest, demonstrate that it is passing through a phase of extraordinary activity. These spots are so large that several of them exceed the diameter of the earth by at least six times. The luminous surface of the sun is at the same time shining like a true ocean of fire and projecting above it brilliant eruptions and fantastic flames that are from three hundred thousand to three hundred and fifty thousand miles in height. Something, then, is taking place in the sun; and, as distant as we are from the king of the stars (94,000,000 miles), our poor little globe feels the effect of the revolutions that are being effected so far from her. As a proof of this, it is only necessary to observe the curious magnetic disturbances that act upon the magnetized needle. Let us endeavor, then, to set forth the mysteries whose theater is the sun. Let us give a few ideas as to the size of this orb, and state in the first place that it weighs 324,000 times more than our globe, and that an express train, running at the speed of about 3,000 feet a minute, and at a constant speed without interruptions, would take 149,000,000 minutes, or 283 years, to reach us, and that, notwithstanding such remoteness, the solar energy is so prodigious that the heat received by the earth suffices to keep up here all the phenomena of vegetable, animal, and human life; for everything that moves, everything that lives around us, comes from the sun. Wood, coal, gas and electricity —all are stored up sun.

Mr. Flammarion recalls the curious calculation according to which the calorific power of the sun is so enormous that it would cause to boil ten trillion cubic miles of water at the temperature of ice! Finally, if the sun should come to the distance of the moon from us, the entire earth would melt like a ball of wax.

Let us add that the attraction between the sun and the earth is almost instantaneous, and we shall see that we are the true children of the sun, and that we are dependent upon and live only through it.

What is this solar surface that puzzles us so much? When we study it by the telescope, or by means of photographs, we see that the solar surface is not smooth, level, and homogeneous, but granulated—covered with grains and strewed here and there with spots of varied dimensions. This solar surface is not solid, nor liquid, nor gaseous. It is, upon the whole, but a stratum of luminous dust that floats upon an ocean of very dense gas having nearly the density of water. The spots are apertures formed in this solar surface. When we observe them they seem to be black, but this is merely an illusion caused by contrast. In reality, these nuclei are 2,000 times more luminous than the full moon. Above the solar surface there extends all around the globe a stratum of burning gas of about 9,000 miles in thickness, which is called the chromosphere and in which hydrogen prevails. This stratum is rose-colored and entirely transparent. It is from thence that proceed those flames of from 300,000 to 350,000 miles in height, and likewise rose-colored—those gigantic perturbations that have their rebound upon the earth and that so greatly perplex astronomers. It is to this that are at present directed the scientific observations which the illustrious author sums up thus:

"At the Observatory of Paris Mr. Deslandres has succeeded for some time in photographing invisible flames upon the very surface of the solar disk. A most ingenious photographic process, founded upon the spectroscopic aspect of the lines of the spectrum of calcium (one of the metals that exist in the solar atmosphere), reveals the incandescent masses of the chromosphere and of the protuberances. These images of the vapors of calcium, these facular flames, are not the faculæ or white spots that are perceived distributed here and there over the surface of the radiant star; they resemble them, but do not coincide with them. They are formed by the most intense parts of the chromosphere and protuberances. This new apparatus, the spectrograph, does not give a photograph of the faculæ of the photosphere, but an exact image of the chromosphere such as it would be seen were the photosphere removed. It is the first time that these flames have been photographed, not around the disk, as at the time of eclipses, but in front of the solar disk itself.

"It is quite curious, but not a rare thing in the history of the sciences, that precisely at the time that such studies are being made in France by our learned colleague, Mr. Deslandres, they are being pursued in America by Mr. Hale, dirctor of the Kenwood Observatory at Chicago.

"So the flames of the sun, sung upon all lyres, are no longer a metaphor; the star of day bristles with them. Their number and size vary like the spots themselves. A maximum of activity manifested itself in 1871; again in 1883, but less strongly; and now, for six months past, the star has been in a state of excitation that much surpasses the last. Such fluctuation is of about eleven years; we do not as yet know the cause of it.

"But the most curious point, perhaps, is that these manifestations of solar activity have their echo, their repercussion, upon our planet in the variations of the magnetic needle. The more movements there are upon the sun, the more this needle is agitated here, at 94,000,000 miles distance! Sometimes, even, the agitation is so violent that the compass is entirely disoriented, that an immense magnetic disturbance exhibits itself over the entire globe, that telegraphic communications are interrupted, and that telephones refuse to operate. This is especially what happened on the 25th of February last. And then one speaks to us of a void between the stars! No, space is not void; it is, on the contrary, a bond of communication between the worlds. The fearful solar tempests, in comparison with which our most violent storms, our thunder, our volcanoes, and our earthquakes, are but as the smiles of an infant in the cradle, make themselves felt here, and, unquestionably, upon our neighboring worlds, Mars and Venus, at the same time. We might say that we have here already something like an electric, telephotic communication. Who knows whether some day, soon perhaps, an Edison will not find a means of hearing these voices of the sun and of receiving the perturbations of Mars and Venus, and of seeing them, perhaps, if they manifest themselves as they do here by auroræ boreales. We are at this very moment at the maximum of auroræ, and more than ten have already been observed since the beginning of the year. I may add also that, according to my personal observations, which doubtless may be confirmed by others, the zodiacal light, which is remarkably intense this year, offered an analogous maximum in 1871."

Notions as to the solar spots, of which it is so much a question in contemporary astronomical science, are of very ancient date. Ovid and Virgil speak of the spots, and Chinese astronomers observed them from the year 301 to the year 1205 of our era.

In the middle ages people did not wish to admit their existence, as it was opposed to the science of Aristotle.

On this subject Mr. Flammarion cites a very instructive anecdote. Father Scheiner, a Jesuit of Ingolstadt, observed them scientifically for the first time in 1611, and referred them to the provincial father of his order. The latter, a pronounced peripatetic, astounded at such a discovery, answered that it was certainly imaginary; but that, in order to be agreeable to the observer, he would verify the accuracy of it. The next day, Father Scheiner came to ask a definitive solution, and the provincial father answered him:

"I have reread Aristotle all through, and I can assure you, my son, that there are no spots upon the sun. They are in your eyes or in the glasses of your spectacles."

No matter. Notwithstanding Aristotle, the solar spots have made their way. Not only does science now admit their existence, but is still striving to rob them of their secrets.—La Revue des Revues.

Report of the Commissioner of Patents.

The customary annual report to the Secretary of the Interior, for the fiscal year ending June 30, 1894, by Mr. John S. Seymour, Commissioner, has just been published in the Official Gazette, from which it appears there were received in the fiscal year ending June 30, 1894, 35,952 applications for patents; 1,050 applications for designs; 108 applications for reissues; 2,193 caveats; 1,720 applications for trade marks; and 368 applications for labels. There were 22,546 patents granted, including reissues and designs; 1,656 trade marks registered; and 2 prints registered. The number of patents which expired was 13,167. The number of allowed applications which were by operation of law forfeited for non-payment of the final fees was 4,566. The total expenditures were $1,053,962.38; the receipts over expenditures were $129,560.80; and the total receipts over expenditures to the credit of the Patent Office in the Treasury of the United States amounts to $4,409,366.74.

During the past year there has been a notable falling off in the applications for patents, designs, etc. For the year ending June 30, 1894, the number was 39,206, against 43,589 for the previous year, and more than the last mentioned number for each of the three prior years. The cost of publishing the Official Gazette was $113,642, of which 7,000 copies were issued weekly, the cost of each copy being a little over $16 per year, while the subscription price is only $5 a year. The paid circulation is small. A large number are given away.

The Chinese Foot Binding Practice.

According to Dr. Haslep (China Med. Missionary Journ., June, 1893) the ordinary method of binding the feet is as follows:

While the great toe is left straight, the other toes are folded on the plantar surface of the foot, often until the tips of the toes are on a line with the edge of the inner side of the foot, and then the foot is bound "snugly." Gradually the bandage is made tighter and tighter. When the metatarsal bones begin to curve, making the characteristic lump on the dorsum of the foot, the bandages are tightened more rapidly than before. If swelling takes place above the ankle, the foot is bandaged more tightly. If ulceration occurs, the foot is bandaged still more tightly. Swelling is not a desirable complication. Ulceration is greeted with joy, for it is usually a sign that the foot is yielding gracefully to the inevitable. "Lan siau kiah" (ulcer, small foot) is a common saying. To make the smallest foot with the minimum of suffering and produce no untoward results is the desideratum; this process should take about ten years. Patience will then show her perfect work; that which foreigners call a deformity and restricted locomotion are necessary sequelæ, not untoward results. They begin to bandage the feet of a child when she is between three and four years of age. Generally the services of a professional bandager are obtained. This woman carries with her a stock of small wooden shoes of various sizes. These are the patterns. Her patrons choose the size desired. A contract is then made to have the foot of this size in a certain length of time—three years or more or less as the case may be. The professional bandagers, for the most part, fulfill their contracts with superb indifference to the children's sufferings, and sometimes with such results as the death of the child, gangrene of the feet, necrosis of bones, etc.

Salophen as an Anti-rheumatic.

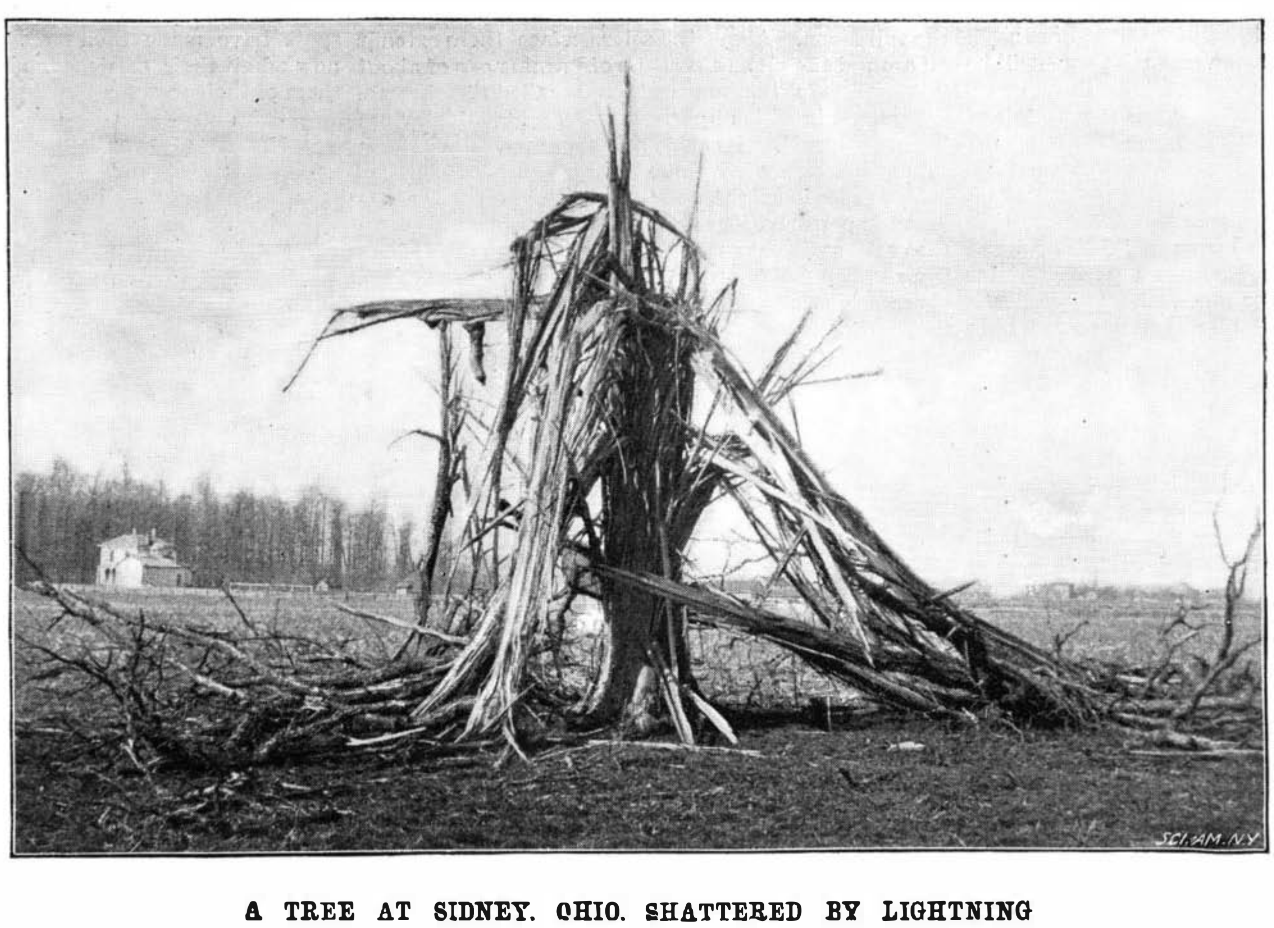
According to the observations of Drs. B. Ciullini and A. Viti, at Siena, salophen is an excellent remedial agent, both in acute and chronic rheumatism, its advantages over salol and salicylate of soda being that it is tasteless, not hygroscopic, and devoid of unfavorable after-effects.

Its chief indication is in the initial stages of acute arthritic and in mild or subacute cases. In obstinate or chronic cases it is advisable to follow its administration with that of iodide of potassium. The antipyretic action of salophen is not marked. In the intestinal canal it acts as an antifermentative, and it destroys the reaction of indican in the urine. Doses as high as 5·0 to 6·0 gm. pro die continued for several days are not attended with disturbances of any kind.—Terapia Clinica, April 4, 1894.

A TREE SHATTERED BY LIGHTNING.

We are indebted to Mr. Frank Woodmancy, of Sidney, O., for the accompanying photograph of a tree which was struck by lightning on the farm of Norman Key, four miles east of Sidney, Ohio, on the morning of March 15, 1894. The tree stood in an open field and was of the species known as burr oak. The tree was tall and healthy, and the trunk measured over two and one-half feet in diameter. Slivers of the tree were scattered over the field, some being thrown more than 60 rods away.

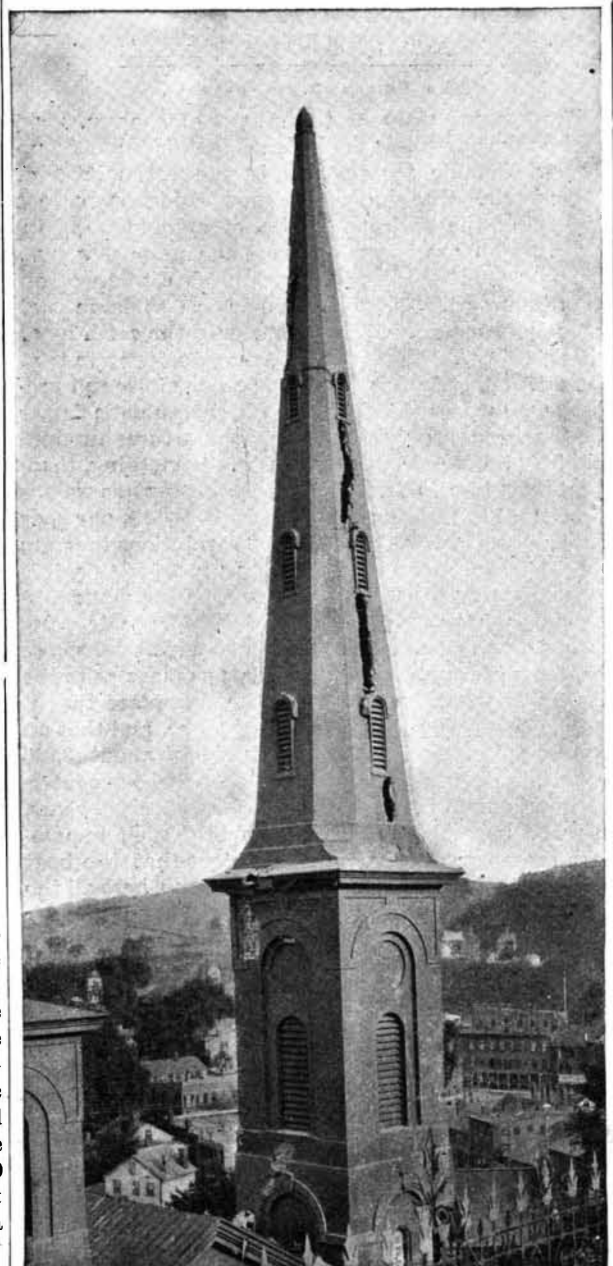
In such cases it is supposed the lightning converts the sap of the tree into steam with such tremendous energy as to cause the wood to explode in all directions. The process of the late A. S. Lyman, patented in 1858, for preparing wood for paper pulp, was based on the same principle. Lyman provided what he termed a steam gun, which consisted of a long steam boiler wherein blocks of wood were boiled under a very high pressure, and at the proper stage in the operation one end of the boiler was suddenly opened, when the contents shot out, and with a report like a cannon the fibers of the wood exploded, converting the wood into fine shreds.



A TREE AT SIDNEY, OHIO, SHATTERED BY LIGHTNING

CHURCH SPIRE, NORWICH, CONN., STRUCK BY LIGHTNING.

We are indebted to Mr. F. J. Moulton, of Norwich, Conn., for a photograph showing the damage done to the spire of the Broadway Church, in that city, by lightning on the 29th of July last. We give an engraving herewith. The spire is of brick, 198 feet high,



CHURCH SPIRE, NORWICH, CONN., STRUCK BY LIGHTNING.

with a cap of brownstone. The spire was not protected by lightning rod. The stroke took place during a terrific thunder storm about 1.30 P. M. Spectators say it was a fire ball that fell upon the spire, which then exploded, blowing out the brick walls in several places and leaving rents, some of which were fifty feet in length. The debris, in the shape of bricks and mortar, was hurled in all directions to considerable distances.

The simple expedient of a lightning rod, well grounded, would, doubtless, have saved this building from injury.

Printing Out Papers.

Within the past four years considerable progress has been made in the production of ready printing out papers, which are distinguished from those required to be freshly sensitized and printed from the day they are prepared in the fact that, when once made, the ready sensitized will keep intact for several months, and may be used at any time and in any climate. Since the manufacture of gelatino-bromide paper began, about thirteen years ago, improved methods have been invented for coating paper with collodio chloride emulsions, until now a high degree of perfection has been reached. Instead of collodion as a medium, gelatine emulsions are used as a vehicle to hold the chloride of silver salts. Each has some faults or difficulties. A medium between them has recently been perfected in paper called the Nepera, which we have tried with considerable success. It possesses a particularly tough film, which is insoluble in warm water, and can be turned or bent upon itself without the least injury. It is also very easy to work and prints rapidly. No extra care is required in the toning or fixing operations. It is well adapted for use in warm climates, because of the toughness of the film.

The prints should be printed quite a little darker than it is desired to have them. They are first put in water, which is changed two or three times until the milkiness disappears. At this stage they are a light red color and are immersed in the toning bath made as follows:

Water	30	ounces.
Acetate of soda	60 to 90	grains.
Borax	25 to 30	"
Gold solution (15 grains of chloride of gold dissolved in 15 ounces water rendered alkaline with bicarbonate of soda)	1 to 2½	ounces.

The toning takes from five to eight minutes. It is essential that the bath be alkaline, and it should be tested with blue litmus paper, which should not turn red when dipped in the solution.

From the toning bath the prints are transferred to an acetic acid acidulated bath for a minute or two. Just enough acid is added to the water to produce a slight acid taste.

After the acid bath (which checks toning action and clears the whites) the prints are put into an alkaline hyposulphite of soda fixing bath for ten minutes. The bath is made up of 1 ounce of hyposulphite dissolved in 16 to 18 ounces of water, or to about 12° or 16° hydrometer test. Then the prints are washed for an hour in changing water, and when dried are ready to be mounted.

In all these operations there is no tendency of the paper to curl up—a great convenience where large numbers of prints are handled. It can be squeegeed while wet on a ferrotype plate, which gives it a high polish, or it may be burnished, the same as a silver albumen print. The Nepera Chemical Company also make a new bromide paper, called platinoid, from the fact that when printed, developed, and fixed, it has a color very similar to the popular platinum print.

Machines are perfected for printing rapidly on this paper by means of electric light. An establishment in this city is able to make on a continuous large roll several thousand exposures in an hour. The paper, still in ribbon form, is then automatically passed through a developer and fixing bath, and at last dried, the pictures being afterward cut out. Duplicate photographic prints are thus made very uniformly.

A GREAT deal of trouble is expended in educating the showy, high stepping horse. He is trained to step high and act showily by being driven along a path whereon rails are set crosswise; he steps high to avoid stumbling, and in time always steps high.