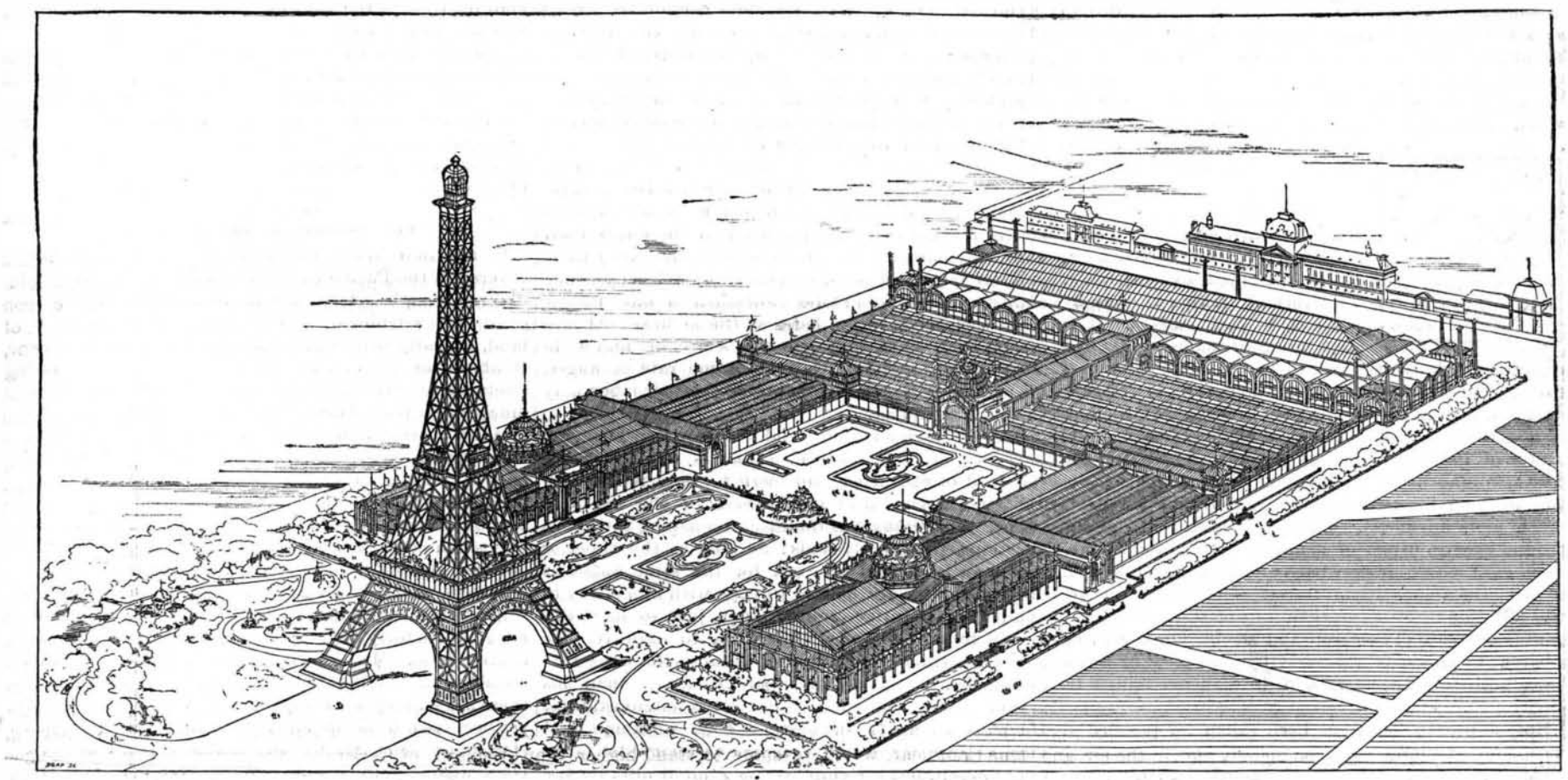
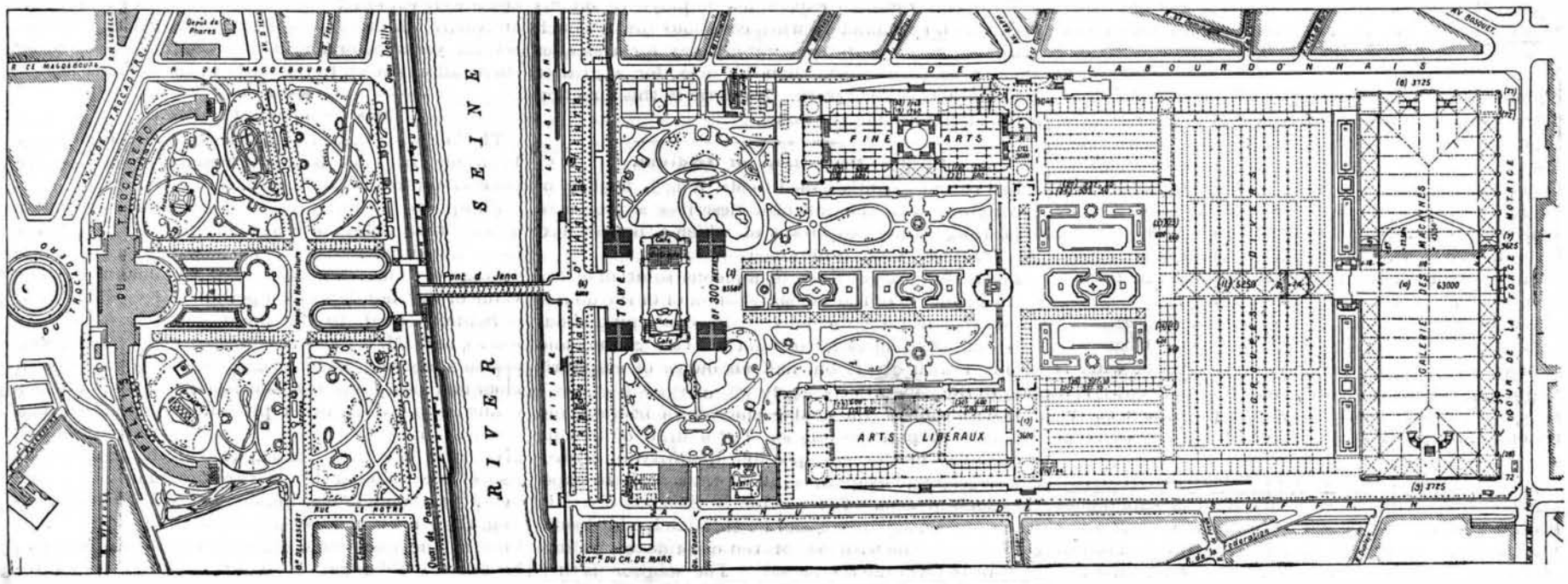




THE PARIS INTERNATIONAL EXHIBITION.

The crowning triumph of the French republic, reserved for the centennial anniversary which changed the destinies of the great nation, and gave liberty and license to her children, will be worthy of France and of the occasion the country feels called upon to honor. There are still two years to pass before the Great International Exhibition of 1889 will be opened to the public, but they will be all too short to complete the vast scheme which has been evolved from the numerous plans submitted for consideration, and which is now being pushed forward with the system and zeal which distinguish the organization and energy always characteristic of great public undertakings in France. As will be seen from the perspective view and general plan we publish this week, the exhibition buildings will occupy the whole of the Champ de Mars, the quays on each side of the river, and the extensive grounds of the Trocadero and the Palace itself. The most striking feature of the exhibition will be the great Eiffel Tower, nearly 1,000 ft. in height, opposite to and axial with the Trocadero Palace and the Pont de Jena. At the other end of the Champ de Mars, and extending for its whole width, will be a vast hall, covered with an arched roof about 350 ft. span, to be devoted to machinery. Adjoining this will be a vast building for miscellaneous groups, and on either side will be two great halls, one devoted to art and the other to industrial exhibits. What space is not covered in will be laid out in gardens. The general arrangement of the buildings will, therefore, be on three sides of a square, the fourth side being occupied by the stupendous monument, which it is reasonably expected will be a source of astonishment and attraction to visitors. A committee has been appointed to assist the commissary-general and the director of sections, to attend to everything relating to electrical matters. The president of this committee is M. Mascart, and it is divided into four sub-sections charged to examine all the questions relating: 1. To electric lighting. 2. Generators and electrical machines. 3. Tests and measurements. 4. Telephones, telegraphs, etc. The first sub-committee, under the presidency of M. Lemonnier, had first to consider two fundamental questions: Shall the exhibition be lighted every evening, and what spaces shall be lighted? Naturally, the first question was promptly answered in the affirmative. It was indeed considered possible that such a course might be objected to on the ground that theaters, concerts, and other places of public resort might suffer, but, on the other hand, it was obvious that, during the time of the exhibition, Paris would be so crowded with visitors as to secure ample audience for every species of entertainment. Moreover, electric lighting will be undoubtedly one of the great attractions to exhibitors who could only get justice after dark. In order to arrive at an approximate estimate of cost, it was indispensable to describe what portion of the exhibition should be lighted. First the Trocadero Palace might be thrown out of consideration, as it will be lighted by gas. The question of illuminating the Eiffel Tower is also held in reserve. The portions of the exhibition opened to the public at night will be limited to the terraces, the art galleries, the industrial exhibition, the agricultural exhibition, the machinery hall and approaches, as well as the restaurants and offices. The areas of the various surfaces to be illuminated are as follows:

1. *Open Spaces.*

	Square meters.
Gardens	188,810
Courts outside machinery hall	17,075
	205,885

Or about 2,213,000 sq. ft.

2. *Covered Surfaces.*

Machinery hall	63,000
Central gallery	5,250
East and west galleries	7,200
Offices, etc.	900
	76,350

Or about 818,760 sq. ft.

Besides the foregoing, there will be at least 184,000 square feet for the industrial and art galleries, restaurants, etc. An approximate estimate shows that some 3,000 horse power will be required to produce the necessary light of 3,000,000 candles.

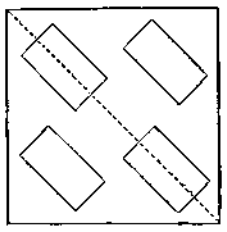
Under the auspices of the syndical chamber of electrical industries, a syndicate has been formed for undertaking this great work. This syndicate, which includes among its members the leading electrical engineers in Paris, has offered to furnish the material, and to furnish light at all the private and public parts of the exhibition that will be open at night, on their own responsibility. Other French and foreign exhibitors will, however, be invited to aid the syndicate with engines, dynamos, and plant. The remuneration of the syndicate will consist: (1) A payment of one franc for each evening visitor, the entrance charge being fixed at two francs; (2) a tariff to be paid by private users; this tariff to be fixed by the administration.

It is not too much to say that the success of lighting the 1889 exhibition will be assured, thanks to the initiative taken by the Paris manufacturers of electrical plant, who, to the number of six, have undertaken the responsibility.

THE EIFFEL TOWER.

As soon as the construction of the Eiffel Tower in connection with the Paris Exhibition of 1889 was decided on, the works were commenced and pushed forward with so much activity that very shortly the first portion, that is, the foundations of the four columns forming the base, will be finished, and it will be of interest to describe them before they are covered up out of sight. As is well known, the tower, 984 ft. in height, will rest on a base occupying a square, and be carried by four steel columns, supported on masonry piers, 328 ft. apart from center to center. The axis of these foundations coincides with that of the Champ de Mars, and their sides are perpendicular to the Seine. They occupy the site which since the 1878 exhibition had

been utilized as a garden. The two masonry piers nearest to the Seine are in ground which the old maps of Paris indicate as having been occupied by an arm of the river, so that there is no wonder that the excavations revealed the presence of water a short distance below the surface. The further piers, on the contrary, rest in firm gravel, entirely free from water. On this account different methods had to be followed in constructing the foundations of the two sets of piers. Those nearest the Seine are being formed with caissons sunk by compressed air. The ground over the whole surface of each pier was first removed to a slight depth, and then at the bottom of this rectangular excavation were placed four large wrought iron caissons 49 ft. 3 in. long by 19 ft. 8 in. wide and 10 ft. high. About 6 ft. above the bottom of the cassion a platform or roof was made, carried on a series of girders 18 in. deep. These caissons are placed in such a way that their principal axes are parallel to the diagonal of the excavated rectangle, which converges toward the center of the base of the tower. It is in the same direction that all the angles of the structure lie, and the thrusts be exerted. The cassions thus arranged, as shown in the annexed diagram, are provided with the ordinary pneumatic appliances on the floor of the partition above referred to, the space beneath serving as a commodious working chamber, which is lighted by electricity. The work of sinking is done by ten men in each caisson. It is kept up continuously day and night, and a daily average progress of 15 in. or 16 in. is made. The ultimate depth of the bottom of the caissons is 32 ft. 9 in. below the ground level. At the end of last week the four caissons of the piers nearest the center of Paris were almost erected. Those for the corresponding piers are nearly in their final position. The work on the two piers furthest from the Seine is much more advanced. They have been built on the ground over an invert of beton 6 ft. thick, and are finished each with four skewbacks at an angle of 52 deg. to carry the arches of the tower. The superstructure will rest on 3 ft. of masonry on top of the piers, and a double bedplate of cast iron and steel. These will be secured to the masonry each by two holding-down bolts built into the piers, 4 in. in diameter and 23 ft. long.



Special precautions have been taken for passing off harmlessly underground the atmospheric electricity which will accumulate on this gigantic lightning conductor. A commission of electricians was appointed to consider this question, and to point out the precautions that should be taken. They consist in sinking below the foundations ten cast iron tubes 20 in. in diameter, which are connected with the metallic structure. In a few days the ground around the foundations furthest from the Seine will be filled in, and only the skewbacks to carry the framework will be visible. When the caissons of the other piers are sunk they will be filled with beton, and the masonry base will be built upon them. Nothing has yet been definitely fixed as to the elevators. There will be one in each inclined column, and from a level of 490 ft. there will be only two, which, however, will work vertically. Several different types have been under consideration. It is calculated that the pressure of the tower on its base will be about 57 lb. per square inch. The effect of wind is allowed for in this estimate at about 33 per cent. It is also calculated that the maximum oscillation at the summit of the tower will not exceed 7 in.—*Engineering.*

Tuning an Organ by Telephone.

A Birmingham paper says that a novel experiment was recently tried there with the telephone. A letter was received by Messrs. Rogers & Priestly, musical caterers in that town, asking them to send an organ to suit a pianoforte to a room at Moseley, where a concert was to take place that night. The firm were totally at a loss to know the precise tone of the piano, and consequently despaired of being able to comply with the demand in time. However, much to their surprise, they found that they could communicate with the people at Moseley through the telephone. Forthwith Messrs. Rogers asked that one of the notes of the piano should be struck. When this was done, the sound could be distinctly heard in Colmore Row, and by gradually reducing the pitch pipe the tones of both instruments were made to correspond.

Hypnone.

Von Schuder writes of fourteen patients treated by acetophenon, or hypnone, in whom favorable results followed. A dose of from 2 to 4 drops was sufficient to produce sleep of several hours' duration. The effect was especially happy among the phthisical.

No ill after-effects were observed. In one case only, after 6 drops had been given, the patient awoke from a long sleep with headache and slight vomiting. The effect, dependent upon the dose and the individual peculiarities of each patient, was manifested after from one-half to one and one-half hours.—*Der Pharmaceut.*

Incentives to Better Work.

One of the strongest inducements the mechanic can see in striving to learn to do work better and quicker is the prospect of increased wages. While to a certain extent there may be a desire to excel, yet if there is no particular profit in excelling, the principal inducement is gone. It is of course sometimes difficult, where large numbers of men are employed, to grade them so that justice will be done to all. Employers recognize this fact, yet it can be done. Where men are working under the piece system, the better workman gets pay at least for his ability to do more rapid work. And here, too, comes one of the worst difficulties with labor unions or organizations. They to a certain extent have the same question to deal with. Where men are paid by the piece, the difficulty is apparently overcome. But there are so many kinds of labor in the performance of which this system cannot be carried out, that it is utterly impossible to solve the question by this plan. To a class one of the strongest inducements to joining a labor organization is the prospect of securing an increase in wages. This class is greatly benefited, in the matter of wages, by membership in a labor union, for they receive the same wages as their fellows, provided the piece system is not in vogue; whereas if working outside the pale of a labor organization, they would be compelled to stand on their merits, and consequently put up with the wages their abilities command—in short, receive what they earn, and no more. Masons, carpenters, blacksmiths, machinists, in fact the skilled workmen of most trades, place themselves on a level with the unskilled and incompetent when they join a labor union, and without the piece system receive the same rate of wages, no matter how much more profitable their labor may be to the employer.

Does not such a system tend to discourage men who have the ability to excel? Does it not lower the standard of excellence and merit? Does it not produce indifference and carelessness in the ranks of labor? The *Industrial Gazette*, after asking the above questions, pertinently adds: So long as the superior workman is obliged to work for the same wages as other men who are unable to cope with him either in quality or quantity of work done, just so long will he fail to see the object of striving to improve. He is not benefited by the union, because the wage rate established by fellow members is lower than his ability would command under other circumstances. He pays a penalty for being a good workman, and membership in the union entails pecuniary loss. Not only himself, but his employer is injured also, for the latter has a right to expect his employe to do his best, which he cannot do when conscious that a slouch workman receives the same rate of pay for a smaller amount of poor work than he does for a greater amount of first class work. A reform in this direction is the crying need of the hour.

Electro Deposition of Iridium.

In a patent recently issued to Mr. Wm. L. Dudley, of Covington, Ky., the inventor describes a process of depositing iridium, by means of which a bright, flexible reguline deposit is obtained.

The inventor uses either an aqueous solution of the double chloride of iridium and sodium or of the double chloride of iridium and ammonium, containing about two ounces of metallic iridium to the gallon, and acidified with about one-half an ounce of sulphuric acid to the gallon.

The solution of the double chloride of iridium and sodium is prepared as follows: The hydrate of iridium is dissolved in the least possible quantity of hydrochloric acid and evaporated in a water bath to expel the excess of acid. The residue is then dissolved in water and an amount of sodium chloride is added sufficient to combine with all of the chloride of iridium present to form the double salt. The solution is then diluted to the required amount, so as to contain about two ounces of metal to each gallon of liquid. The required amount of sulphuric acid is then added, and the solution is ready for the electro deposition.

The solution of the double chloride of iridium and ammonium is prepared as follows: The hydrate of iridium is dissolved in the least possible quantity of hydrochloric acid and carefully neutralized with ammonium hydrate. It is then acidulated with sulphuric acid until all of the precipitate produced by the ammonium hydrate is dissolved, and finally diluted with water until each gallon of the liquid contains about two ounces of the metal. The solution is then ready for work when acidified, as before mentioned.

From both of these solutions Mr. Dudley obtained a thick, bright, and reguline deposit of iridium; and he has found that a plate of iridium or phosphide of iridium, as made by the Holland process, if used as an anode, will dissolve in these solutions while the current is passing.

As in electro plating with other metals, it is essential, to obtain good results, that the articles to be plated should be perfectly clean. A brighter and smoother deposit is obtained if the articles are highly polished before they are introduced into the iridium bath. In plating articles which are readily attacked by the solution, it is of course desirable to first coat them with some metal not appreciably affected by such solutions.

In the deposition of iridium from any of its solutions it is necessary to avoid battery power of too great intensity; and in case the intensity be too great, it can be recognized by the deposit becoming dark and powdery, and also by an excessive evolution of gas from the surface of the anode and cathode. In managing the solution, alkalinity should be avoided, although neutral solutions may be employed; but acid solutions are to be preferred.

During deposition, where a thick deposit is required, it may be found necessary to remove the articles from the solution from time to time, and to wipe them in case the deposit should have a tendency to become black; but this blackness may be avoided by proper manipulation of the solution and battery power, and also by proper cleansing of the articles. It is also found that when the articles to be plated are kept in gentle motion during deposition, the deposit will take place faster and be brighter and thicker than if they are allowed to remain stationary. Mr. Dudley does not claim, however, that the plating produced by his process will resist the action of acids which will dissolve finely divided iridium.

The Islands of the Pacific.

In addition to the two large islands recently discovered in the Pacific Ocean, a third has just been discovered lying less than 100 miles from the northern coast of New Guinea. It has been named Allison Island, is nearly three miles long, rises from 100 ft. to 150 ft. above the sea, and has abundant timber. Several stretches of fertile and inhabited land, some of them much larger than Allison Island, have been found within a few years at a distance of 200 or 300 miles from the New Guinea coast, and similar discoveries are made once in a while in various parts of the Pacific. Although the maps of the Pacific Ocean are studded with islands which appear to be lying close together, vessels may sail among these islands for weeks together without once coming in sight of land. So vast is the waste of waters, that not long ago a crew which had been shipwrecked in the great island region of the Pacific rowed north forty days before they reached Hawaii, the nearest land. Mr. A. R. Wallace, who has traveled widely in the Pacific, has expressed the opinion that there are still a good many islands which have never yet been seen by white men. Now and then a Pacific trader finds some new or little known island, and opens trade with its inhabitants. When the Woodlark Islands were explored some time ago, it was found that an Australian firm had carefully charted the islands several years before, and had been quietly trading there, all unknown to the other Pacific merchants.

Basic Slag as a Fertilizer.

The following matter is the result of investigation by Professor Dr. Paul Wagner, director of the agricultural laboratory at Darmstadt:

Phosphate in finely crushed basic slag acts more quickly than phosphoric acid in crude guano or bone meal, notwithstanding the slag contains a larger percentage of lime than the other two manures. The value of the slag depends upon its fineness. Slag I. is reduced equal to the finest flour; II. is slightly less so, and III. is twice as course as II., yet barely one fourth as active. Basic slag is especially valuable on moor and peaty meadow soils, and the author deems it unwise to use any other phosphate manure on such earths. In laying out pastures and meadow, the slag gives great help when placed deep in the ground, and its use is advocated in vineyards, orchards, and gardens. If ammonium sulphate be used additional to slag, they must not be strewn as a mixture, as the lime in the slag would liberate ammonia. Slag can be mixed with nitrate of soda and potash salts without deterioration; but to prevent adhesion from standing unused, powdered peat must be added. The iron in the slag is not at all deleterious.

Preservation of Wooden Poles.

A simple method of treating wood with preservative solutions is employed in Norway for telegraph poles. After the poles are set in place a man goes from one to another with an auger, with which he bores a hole in each post, beginning at a point about 2 feet above the ground, and boring obliquely downward, at as small an angle as possible with the axis of the post, until the point of the auger reaches the center of the stick. The auger hole should be an inch in diameter, and, in telegraph poles of the ordinary size, will hold easily 4 to 5 ounces of sulphate of copper, which is put into it in the form of coarsely powdered crystals, and the opening then stopped with a plug, the end of which is left projecting as a handle, so that it can be pulled out and replaced. It is found that the crystals of copper sulphate disappear slowly, so that every three or four months the charge must be renewed; while the wood, both above and below the auger hole, even to the very top of the pole, gradually assumes the greenish tint due to the presence of copper in the pores.