ELECTROPLATING THE DEAD.

Man has always shown himself jealous of paying a peculiar adoration to the dead, and yet he has never taken more than an ordinary interest in the preservation of cadavers. The Egyptians, it is true, secured the preservation of the dead by very nice methods. Daubenton and, more recently, Czermak give us some information in regard to this. In ancient Egypt there existed special laboratories in which the bodies of the dead were submitted to more or less complicated manipulations. The cadavers were immersed in antiputrescible baths and then swathed by the relatives with thousands of bandages. But it may be asserted that the Egyptian embalming was, so to speak, an exception, for the rich alone were capable of having it done. In our time the art of embalming has not made much progress. Usually, the most that is done is to inject into the arteries of the cadaver a sterilizing liquid whose composition varies, and little attention is paid as to what will supervene. Besides, as in Egypt in the time of Ptolemy, this mode of preservation is applied only exceptionally.

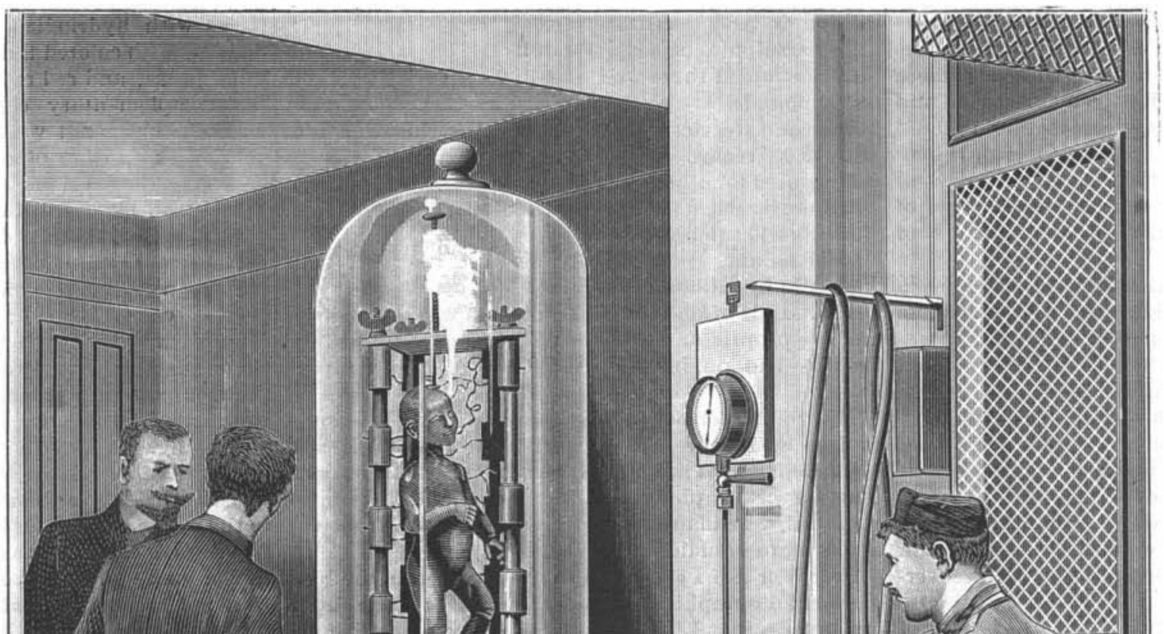
Must we look to the imperfections of the processes for the little inclination that we seem to have for mummification or embalmment? Are we fatally obeying a law of nature—that law formulated in those words of the Scriptures: "Dust thou art and unto dust shalt thou return"? Dr. Variot, one of the most distinguished physicians of the Paris hospitals, answers these two questions by proposing to his contemporaries the use of electro-metallurgic processes for obtaining indestructible mummies. The doctor metallizes our entire cadaver. He surrounds it with an envelope of bronze, copper, nickel, gold or silver, according to the caprices or wealth of those who survive us. Does this awaken the reader's curiosity? Does he wish to know how Dr. Variot proceeds?

Glance at the reproduction of the drawing that we had made at the laboratory of the Faculty of Medicine, where the doctor is carrying on his researches. In a double frame with four uprights connected at the top and bottom by four square plates will be seen the body of a child, which has been perforated with a metallic rod. One of the extremities of this rod abuts against the arch of the cranium, while the other is inserted as a pivot in a metallic bearing situated in the center of the bottom plate of the frame. The frame support is a conductor of electricity. The uprights and conducting wires are carefully insulated with rubber, gutta percha, or paraffine. The electric current is furnished by three small Chaudron thermo-electric batteries. A circular, toothed metallic contact descends from the top plate and rests lightly upon the vertex of the cadaver. The lower surface of the feet and the palms of the hands rest upon two contacts. In addition to this, contacts are distributed along the uprights of the frame, in order to be applied at the desired points, with the possibility of shifting them at will.

Before immersing this apparatus in the electro-metallurgic bath, it is necessary to render the body a good conductor of electricity. To this effect, the operator paints the skin of the cadaver with a solution of nitrate of silver, or else sprays the cutaneous surface with this solution by means of a well known apparatus—the atomizer used by ladies for perfuming themselves. This operation having been performed, the skin becomes of an opaque black, and the silver salt has penetrated as far as to the derma. But it is necessary to reduce this silver salt, that is to say, to separate it from its oxide. To do this is very difficult. The double frame is placed under a bell glass, in which a vacuum has been formed by means of a tromp, and into which vapors of white phosphorus dissolved in sulphide of carbon are afterward allowed to enter. This is a dangerous operation, like all operations in which phosphorus in solution plays any part whatever.

After the phosphorus vapor has reduced the stratum of nitrate of silver, the skin of the cadaver is of a grayish white, and is comparable to the surface of a plaster cast that has been rendered conductive. There is nothing left to do now but to proceed as rapidly as possible to the metallization. To this effect, the double frame is immersed in the bath of sulphate of copper. We need not describe this operation, which is known to all. Under the influence of the electric current, the deposition of the metal goes on uninterruptedly. The molecules of metal deposit upon the skin of the cadaver, and soon form thereon a continuous layer. The operator must regulate the passage of the electricity with great care, in order to prevent a granular deposit, having but little adhesion. By shifting the contacts properly, he will substitute for the skin a coating of copper that will take on the pattern of all the subjacent parts. By attentively watching the thickness of the deposit upon the face, hands, and all the delicate parts of the body, he will obtain a faithful mould that will exactly recall the details of conformation and the tints of the physiognomy. A deposit of from ½ to ¾ of a millimeter in thickness offers sufficient strength to resist external bendings and blows. A thickness of from ½ to ¾ of a millimeter ought not to be exceeded for the metallic covering of the face and hands, which will thus be perfectly moulded. Upon the trunk, the abdomen, the first segments of the limbs, and the neck, the integral preservation of the plastic forms is much less important. So if it is judged proper to consolidate the metallic mummy, a deposit of from 1 to 1½ millimeters will be given.

What is the future in store for this process of mummification, which Dr. Variot calls "galvanic anthroplastic"? It would be impossible to say. It is infinitely probable that metallized cadavers will never figure, except in small number, in our cemeteries, and that for a long, long time to come we shall undergo that law we recalled at the beginning: "Dust thou art and unto dust shalt thou return." The inventor of the process just described, however, accords to the total metallization of the body but slight importance. The object of his researches has been more especially to give the museums and laboratories of our faculties of medicine very faithful, very exact specimens, rather than to rescue our cadavers from the worms of the grave.—*M. Edant.*



ELECTROPLATING THE DEAD.

Combustion.

A coal having the following composition, viz., 6 cwt. of volatile constituents, 12 cwt. of fixed carbon, and 2 cwt. of ash and moisture per ton, may be taken as about the average quality used in gas producers for furnace work. Leaving out carbonic acid, this coal would produce a gas of the following composition per volume: Hydrogen and hydrocarbon, 11·07 per cent; carbonic oxide, 29·7 per cent; and nitrogen, 59·23 per cent. Taking the hydrogen and hydrocarbons as approximately equivalent to CH_4, it will be found that they would require thirteen times that weight of air for perfect combustion, while the carbonic oxide made from the fresh carbon would only require about 2½ times its weight of air for perfect combustion. The heat developed by the combustion of the 6 cwt. of marsh gas would be equal to 78,000 C. units, whereas the heat developed by the 12 cwt. of fixed carbon, reaching the furnace in the form of carbonic oxide, would only amount to 67,200 units. From these figures it is seen that the hydrocarbons give in combustion considerably more than half the heat of the fuel, and how important it is to insure by free development of flame in furnace work that their heating effects should be entirely utilized.—*F. Siemens.*

Traffic of the Great Lakes.

A recent census bulletin relates to traffic on the great lakes, and shows that for the year ending June 30, 1889, freights were carried as follows: Wheat, 2,000,000 tons; corn, 3,500,000 tons; other grains, 1,000,000 tons; mill products, 2,000,000 tons; all other farm products, 200,000 tons; coal, 11,500,000 tons; iron ore, 15,500,000 tons; stone, 500,000 tons; salt, 500,000 tons; other products of mines and quarries, 100,000 tons; animal products, 100,000 tons; lumber, 12,250,000 tons; manufactures, miscellaneous merchandise, and other commodities, 2,500,000 tons; making a total of 52,000,000 tons, or more than 1,000,000 tons for each week in the year.

Spots on Venus.

A bulletin of the Belgium Royal Academy of Sciences states that the dark spots that have been noticed by observers on Venus are of a permanent character. Observations have been made of successive rotations of this planet, and the facts demonstrate that after an interval of three years the spots were fixed enough to be recognized, and that the markings are not accidental, but are probably due to some configuration of the land, like those of the planet Mars. The atmosphere is so dense on Venus that the success of the recent observations was much interfered with.

Photography as it was and is.

The art of photography has been so largely developed in America as elsewhere of late years, that it has taken its place beside painting and sculpture, and the camera holds a high position as a valuable adjunct to the pencil and chisel. Like everything else which encourages a taste for the beautiful, it also contributes to elevate and refine the masses. It is a grand privilege to represent the sublime in natural scenery, to bring to the life before us the scenes of other lands to their minutest details, and to delineate the face and form of the great and good, and loved ones, full of expression, caught by the life-giving rays of the sun. From the highest and best developed photograph, perfect in pose, lights and shadows, to the commonest tintype, a new source of pleasure, amusement, and profit has been introduced into the world by photography.

Having been an ardent devotee of the art since its earliest introduction here, through the times when photography required severe study in its chemistry and manipulation (before Kodaks were thought of for lazy people), I think a few notes on its progress to its present perfection may not be uninteresting.

Photography may be said to date its origin from the time of Baptista Porta, who discovered the camera obscura in the 16th century. Between this period and the time of Wedgwood and Davy only a few isolated facts bearing on the case were brought to light at long intervals, and it would profit little to mention them all in their order. I shall only give a brief description of the most important discoveries up to the time of Daguerre and Niepce.

The property possessed by the salts of silver when decomposed by the action of light was well known to the earlier chemists. Mr. Wedgwood, however, was the first who recorded his attempts to use the sun beams for photographic printing. In the year 1802 he published a paper in the *Journal* of the Royal Institution, of London, an account of a method of copying painting upon glass, and of making profiles by the agency of light upon nitrate of silver, with observations by H. Davy, afterward Sir Humphry Davy. From this paper we get the earliest process of sun painting and the first indication of the great discoveries which have followed.

In the year 1812 M. Berard brought the result of some valuable experiments before a commission, composed of MM. Berthollet, Chaptal, and Birt, who stated in their report that M. Berard had discovered that the chemical intensity was greatest at the violet end of the spectrum. When he left substances exposed for a certain time to the action of each ray, he observed sensible effects, though with an intensity continually decreasing in the indigo and blue rays. Hence they considered it as extremely probable that, had he employed more sensitive agents, analogous effects would have been attained. From that time numerous experiments were conducted by several eminent researchers, including the discovery of the more celebrated MM. Niepce and Daguerre.

The experiments of M. Niepce date back to 1814, but it was not till 1828 that he was made aware that Daguerre was pursuing the same line of studies. After this their investigations were prosecuted in common, and later came the discovery of the branch of the art since known as the daguerreotype. In 1833 M. Niepce died, and in 1839 Daguerre communicated his discoveries to the world.

Prof. S. F. B. Morse was in Paris at that time and sent the formulas of the Daguerre process to his brother Sidney Morse, then editor of the New York *Observer*, and he published them. The professor returned to New York the same year and commenced experiments with Prof. John W. Draper, of New York University. The latter gentleman had for more than ten years worked in the same direction as Daguerre and Talbot, long before they had published anything on the subject. In communications to the American Institute and articles published in the transactions of the *Journal* of the Franklin Institute, the chemical effects of light had been treated of by Prof. Draper (or Dr. John W. Draper, as he was best known). He also habitually used sensitive paper, and so early as 1837 examined the impressions of the solar spectrum, proving the interference of chemical rays (*i. e.*, their destroying of each other's effect); investigated the action of moonlight and of flame, either common or colored, red or green; also the effect of yellow and blue solutions and other absorbing media, the decomposition of carbonic acid by lights, etc.

Dr. Draper solved the problem of photographic portraiture, having made the first portrait from life ever taken by any photographic process. In March, 1840, he sent an account, which was published in the "Edinburgh Philosophical Magazine," of his process in detail, and sent specimens of portraits he had taken under the brilliant summer sun of New York. Daguerre had not then ventured on portraits, as it was supposed to require 25 minutes' exposure for a landscape alone. Sir David Brewster confirmed this in an article to the Edinburgh *Review*, January, 1843.

The different processes that followed Daguerre's were very numerous, and some of the most prominent were those of Fox Talbot, Sir W. J. Newton, M. Le Gray, Dr. Diamond, and Messrs. Geoffroy and Lespiault. Nearly all of the above were excellent, and gave fair results and were extensively used by both professionals and amateurs. In 1851 Frederick Scott Archer made known his beautiful collodion process on glass, which was a most important addition to the art and superseded all others known. The value of his discovery can hardly be overestimated, when we take into consideration the great benefits which have accrued from it, as well as the application of the process to so many branches of art that give intelligent employment to thousands of people and bring into use millions of capital. Its employment, however, required serious brain work and the most delicate manipulation to secure success. To give an idea of the value of photography in an industrial point of view, I will give a few statistics very carefully taken twenty-five years ago:

Silver bullion manufactured into nitrate of silver, 50 tons per year.

Pure gold manufactured into chloride of gold, half a million dollars' worth.

Hypersulphite of soda, 550 tons.

Of acetic acid there was sold in New York City alone 50,000 pounds.

Saxe and Reeve's paper supplied the United States with 30,000 reams.

Eggs used for albumenizing paper over 37,000 pounds.

Sulphuric ether for New York alone, 40,000 pounds.

Alcohol 15 thousand gallons.

Card mounts could hardly be estimated, but they were sold by millions.

Thousands of dollars' worth of glass was sold yearly, and the proprietor of one establishment informed me that he had on his shelves $20,000 of photographic glass.

The iron for ferrotypes was imported from Wales, and at least 100 tons were used yearly. In future this will be made here. Thus it will be seen of what importance the art of photography is to us, and if reliable statistics were made to-day, I do not doubt that the above figures would be trebled.

In 1856 or 1857 I exhibited to the members of the New York Photographical Society negatives made by a dry process that I had formulated about a year before. They were very sharp and beautiful in detail, but from the length of exposure (6 minutes) and the two or three hours required for the development, it was supposed that they could never come into general use. Soon after I made some modifications of the process which shortened the time of exposure to one minute. I think these were the first dry plates made in America, and they were heartily approved of by Dr. J. Draper, under whose presidency I served then, as vice-president to the New York Photographical Society. In my remarks to the members, I stated that I believed dry plates would in the future be universally used.

My opinion has been fully verified. It is not my intention to speak of the numerous workers in this field in America who have more than realized the dreams of early heliographers. I will just glance at one phase of the art to-day. The actual work is all done for the operator. Dry plates for the million have taken the place of wet ones, with a vengeance. They are all prepared, and all the solutions mixed ready for use. In my day we had to mix our own, and first study the chemistry of the art before we mixed them. As the sellers of the Kodaks advertise, "You press the button, and we do the rest." They have found literally a "royal road" to photography and a convenient one for travelers or people pressed for time.

The world of art has been startled lately by the news which has reached us from Paris, that Professor Lippman, Professor of Physics at the Sorbonne, has announced to the Academy of Sciences at their last meeting that he has discovered a new process in photography by which colors throughout the whole range of the spectrum can be reproduced on a sensitive plate most accurately. Colors are but numbers of light waves as outlines or shadows are fixed by the present photographic negative and print. The professor's first attempts to take colored photographs have not gone beyond the experimental stages. A long time will, I fear, elapse before this branch of the art is brought to the perfection of the others. After a few weak attempts the professor has succeeded in photographing a stained window in colors as brilliant as the original.

According to the meager accounts given to the public, it seems that the plates are pressed against the opening of a trough of mercury which formed a mirror in contact with the plate. The rays of light pass through the sensitive film, as in the old process, but on reaching the other side of the plate, instead of being absorbed by a dark background, they are sent back by an even surface of the mercury. In this mirror the whole secret lies, for apart from it the process is the same as in ordinary photography.

Daguerre frequently said that when he had been copying any red brick or painted building the photograph assumed a tint of that character, and he labored considerably for the attainment of colors. So did his colleague Niepce work to the same end, with his bitumen-coated tablets, and the report spread all over Europe that he had actually made the great discovery.

Sir John Herschel, the eminent astronomer and philosopher, actually succeeded in procuring upon paper impregnated with the colored juice of flowers a faint colored image of the solar spectrum. He also stated that he had specimens of paper long kept which gave a much better representation of the spectrum in its natural colors than he had before obtained. There is no doubt that Herschel was the first to discover the method of producing natural colors, about 1839 or 1840. It must not be forgotten that to his experiments we owe the introduction of hypersulphite of soda as a fixing agent, and he also first suggested glass plates for heliographic use.

Sir Robert Hunt experimented very much and obtained in many instances colored pictures of the spectral rays, dark upon a bright ground. His paper in the "Philosophical Magazine," for April, 1840, was entitled "Experiments and Observations on Light which has Permeated Colored Media," and in it he described some curious results on some of his photographs prepared with hydriodic salts, exposed to luminous influence, with colored fluids superimposed. The violet, blue, green, and red rays produced not their natural but complementary colors. Some pieces of paper which he prepared with bichromate of potash and a very weak solution of nitrate of soda were under colored glass for ten days, in a window having a southern aspect, and gave a tinting of blue, green, and red.

M. Edmond Becquerel experimented in 1849-50, and succeeded in producing on metallic plates the colors of the spectrum, and copied some colored prints. His process was as follows: Into a jar of muriatic acid diluted with from one to two parts water, he placed a silver plate, having previously connected it with a positive pole of a galvanic battery, the negative of it terminated by a strip of platinum. The silver and platinum were kept about one inch apart until the former became coated with the nascent chlorine to a violet hue. It was then rinsed and dried, and exposed to the colored rays. After an exposure of from one to two days a colored image was formed. He rarely obtained more than one or two colors at once. They were not brilliant and always evanescent.

In 1851 a nephew of Daguerre's partner, M. Niepce de St. Victor, published to the world that he was the discoverer of heliochromy, and that he could, by his process, copy colors from nature on silver plates. I am not aware of his formula, but he exhibited some pictures at the Crystal Palace in 1852, and although they were in a dark place, they had nearly faded out when I saw them. In 1856 I paid a visit to Dr. Diamond, of Surrey, England. He was then experimenting perseveringly with various formulas tending to color photography. He showed me the only good picture I have ever seen made with a camera and lens in colors. It was a view of an old-fashioned, two-story frame clapboarded house, with moss and lichens in many places over the doors and windows. The picture was partly colored, the lichens showing their yellow and gray markings, and the house of a dark brown color. It was very pretty, but the doctor said it was taken while he was experimenting and he could not account for it. It was really a sun picture in colors, and the only genuine one I have ever seen, at least such is my opinion.

About the same time Mr. L. L. Hill, a traveling daguerreotypist, announced that he had at last discovered the grand secret of heliochromy, and could take landscapes and portraits in their natural colors. This news created great excitement all over the scientific world, especially among those who were professed daguerreotypists. In conversation with Professor S. B. Morse on the subject, he assured me that he had made a visit to West Kill, the residence of Mr. Hill, and had seen the pictures said to be taken by his newly discovered process. According to his account they were wonderful productions of colored daguerreotypes of living subjects, as well as exact copies of colored paintings. Although the professor did not see the pictures made, he believed them to be genuine. Many distinguished men visited Mr. Hill, who was always ready to show his pictures, but I do not know of one practical man who ever saw him make one.

In November the same year a committee of the New York State Daguerrian Society paid Mr. Hill a visit, but he refused even to show them his pictures or give them any satisfaction in regard to his secret which was demanded as a right. On the return of the committee to New York a report was published signed by the members, stating that Mr. Hill had "not only deluded himself, but the whole history of his discovery was an unmitigated delusion." The committee, however, rather contradictorily charged Mr. Hill with making profit of his alleged pretense—a charge which is plain would rather militate against the admission of his delusion. They averred, in fact, that from the sale of his books and tuition of pupils attracted by the fame of his discovery he realized a handsome income, and this was the real object of Mr. Hill's announcement.

Later, in company with two other gentlemen, I made a visit to West Kill to Mr. Hill. We saw and admired his pictures, but he would give us no satisfaction as to how they were made, although we offered to pay him handsomely for his trouble. We were obliged to depart without information of any kind; in fact, he positively refused to do anything more than show his pictures. We departed much chagrined after traveling 160 miles for nothing. We had strong surmises that there was really nothing in the process, and time proved we were correct. In 1856 he published a book giving partly his life history and a few formulas and many long letters extolling him on his great discovery. His formulas are very curious and complicated, but those who have tried them never succeeded in taking a picture even with the greatest care and accuracy. Whenever a failure occurred he always made the excuse that "the chemicals were impure, or your manipulation was not careful enough." Several friends and myself tried his formulas, keeping to the very letter, but produced nothing.

Thus it will be seen that photographs in colors have been the great desiderata, and have occupied the mind of every sincere worker more or less. Yet it has ever escaped perfect realization, even by such men as Sir John Herschel, the first to photograph spectral colors, and his successor, Sir Robert Hunt. That it can be done is evident from Dr. Diamond's accidental color picture, but as yet the full secret has eluded the grasp of the most patient investigator. I do not doubt we are on the eve of some revelation respecting it, especially as much more study has been lately given to the properties of light, a subject so vast, yet still wherein there are startling discoveries every year. Professor Lippman has made a step in advance in the right direction, and as far as he has made known his formula it is more simple than any of those of his predecessors. It remains to be seen whether any progress can be made so as to apply it to the arts and sciences. Should he succeed in perfecting this branch, it would be one of the greatest discoveries of the age. There would be "millions in it," for it would revolutionize photography.

NICOLAS PIKE,
First President of the Brooklyn Photographic Society, 1864.

A NOTABLE NEW PULLMAN PASSENGER TRAIN.

The superiority of the accommodations generally provided by our railways for the American traveling public is frequently commented upon by European visitors. It is to be remembered, too, that the comparisons usually made on this score are with the first-class passenger service of foreign countries, neglecting entirely the third and fourth class passenger cars, which carry three-fourths of the passengers, as with us substantially all the travel is what is known as first class. In most foreign countries it is never possible to be oblivious of the numerous class distinctions among the people, and the corresponding variations in the service are very numerous.

Our front page illustration represents a notable new train of Pullman cars just put into service, and which has been styled by the railroad men the "ghost train," because it is composed throughout of cars which are exteriorly of a creamy white. The lettering and outside decoration is done in gold, and the cars present a striking contrast with the cars of all other trains on the road. This train leaves New York for Boston at 3 o'clock every afternoon, except Sunday, over the consolidated road of the New York and New Haven and New York and New England lines, arriving in Boston at 9 P. M. A similar train, made up exclusively of the same style of cars, leaves Boston at 3 o'clock every afternoon, arriving in New York at 9 P. M. As the distance between the two places, by the route traveled, is only 227 miles, it will be seen that no special effort is made to attain a high speed, the rate of travel being a little under thirty-eight miles an hour, including stoppages, but for its clock-like regularity and comfort the service leaves nothing to be desired.

These cars have paper wheels, which is said to contribute to their easy running, and are brilliantly lighted by gas at night, their platforms also having special burners. The gas supply is carried in cylinders nine feet long under each car. No bell cords are employed, but each car has a conductor's signal connecting with the engine, there being just over the door a short lever working in a pipe connecting with a rubber hose under the car supplied with compressed air, whereby a whistle may be blown in the engine cab. Near this lever is another lever by means of which the conductor or any passenger can open a valve to operate the air brakes for stopping the train. The cars are at present fitted with the Baker heaters.

Each train has a combination car, regular passenger coaches, and drawing room cars, there being thirteen in all of these specially built cars provided for the daily make-up of the two trains. The combination car has a small portion of its forward end adapted for a baggage room, the remainder being fitted up for a smoking room, with upholstered willow chairs, a rich carpet on the floor, and the windows fitted with white shades and draperies. The drawing room cars have each twenty revolving chairs and six reclining chairs, and all modern conveniences to promote comfort in traveling are provided. The cars cost about $8,500 each.

Electricity in Foreign Countries.

Experiments are now going on in Germany with electric currents of very high tension, which have a good deal of interest to architects, who are called upon, each day more and more, to plan and direct the introduction of electric appliances in their buildings. Every one will remember, says *The American Architect*, the somewhat acrimonious discussion of a year or two ago about the danger of alternating currents of electricity at one thousand volts pressure, and the proposition of a company in England to use a ten thousand volt current was looked upon as wildly reckless. Now, however, a line is in process of construction to carry a current of twenty-five thousand volts. The line is to be about a hundred miles long, and is to extend from the Falls of the Neckar, at Lauffen, to Frankfort-on-the Main, along the railway route, through Heilbronn, Jaxtfeld and Hanau. It is to be used to convey a force of about three hundred horse power, obtained from the cataract by a turbine wheel, to the building of the electrical exhibition in Frankfort, and the object of using a current of such high tension is to reduce the cost of the wire, under the rule that the smaller the wire, the greater the resistance, and the higher must be the electrical pressure of the current to force its way through it. The current is obtained from a dynamo which delivers it at a pressure of one hundred volts, and is passed through a transformer, which changes it into one of much higher tension. On arriving at its destination, a second transformer changes the current back again into one of one hundred volts, suitable for actuating motors and for feeding incandescent lamps. In the experiments which have already been made, the two transformers were connected to dynamos, a wire about three miles long being stretched between them, passing in various directions about the territory connected with the station. On setting the dynamos in motion, a current of thirty-three thousand volts, as measured by a Thomson voltmeter, was developed, which was reduced without difficulty to one hundred volts by the second transformer. A trial was then made to determine how great would be the tendency of such a current to leave the wire, it having been asserted that a far more feeble current would jump several feet from a wire, to strike a man standing below. With this object, the wire was cut, and the two ends cut brought slowly together. Under a difference of tension of twenty-two thousand volts between the two pieces of wire, no spark forced its way across the intervening space until the ends had been brought within twenty-two millimeters of each other—less than an inch. Another experiment was tried, to see whether the ordinary safety cut-off could be used with so strong a current. A ball of lead was interposed in the circuit, and the effect of the fall of a loose wire, or of a tree, was imitated by dropping a piece of wire across the circuit. The short-circuiting thus caused was instantly felt by the lead ball, which melted, with a flash and small explosion, cutting off the current.

The New Circuit Court of Appeals.

The act to establish a Circuit Court of Appeals, which was approved by the President on March 3, provides for a Court of Appeals of three judges, in each judicial circuit, of which two are to constitute a quorum. The Chief Justice of the Supreme Court, the associate justice assigned to each circuit, and the district judges, are competent to sit in the respective circuits. Any judge before whom a case has been originally heard in the district or circuit court is prohibited from sitting at the hearing of the case on appeal. The term of the court commences the second Monday in January in the cities of Boston, New York, Philadelphia, Richmond, New Orleans, Cincinnati, Chicago, St. Louis, and San Francisco. Appeals from existing district or circuit courts to the Supreme Court may be taken in cases involving the construction of the Constitution, but in admiralty and patent cases the decision of the circuit court of appeals is final. The circuit courts may, however, certify to the Supreme Court "any question or proposition of law concerning which it desires the instruction of that court for its proper decision." In any of the classes of cases made final, which includes patent cases, "it shall be competent for the Supreme Court to require, by *certiorari* or otherwise, any such case to be certified to the Supreme Court for its review or determination."

Patentees of inventions, owners of patents, and inventors have, says the *Electrical Engineer*, abundant cause to congratulate themselves upon the passage of this much needed act. Heretofore, more especially during the past ten years, many of the decisions of the Supreme Court in patent cases have been, to say the least, far from satisfactory. Not only have appealed cases been compelled to wait many years for hearing and final determination, but the crowded state of the calendars has rendered it wholly impossible for the justices to bestow upon intricate and complicated questions anything like the amount of consideration necessary to the proper disposition of them, and in fact many of the opinions themselves are quite sufficient to show that the technicalities of the case could have been but imperfectly understood. The assertion which has often been made, that in cases difficult of comprehension the decision of the Supreme Court has uniformly been adverse to the patent, does not appear to be altogether without reason. The establishment of the new court will not only insure a much more speedy determination of appealed cases, but a far more careful consideration of the points at issue than has heretofore been possible, and we feel well assured that interests of honest litigants, as well as of abstract justice, cannot but be greatly promoted. Such a result must necessarily have a most favorable effect upon the value of patent property, as well as upon the progress of invention and the development of the electrical arts.

Protection of Timber from the Teredo.

Naturally, where the damage possible to be inflicted by the teredo is so great, every art has from time to time been employed in attempts to counteract the effects. The old method of coppering the vessel's bottom has been long in vogue, and is, of course, successful. It was found impracticable, that is, too costly, to use this method of preserving piling and wharves. It was thought that the timber could be poisoned, and many rank poisons, such as arsenic, strychnine, corrosive sublimate, etc., were tried, but the teredo seemed to thrive as well upon timber so treated as in unprepared timber. Solutions of metals, such as zinc, copper, and iron, were also infused in the wood, but proved of no value for the purpose of defense against the mollusk. Some of the properties of coal tar have been found effective, but in the pure state are so soluble in water as to quickly wash out. It was found by experiment that, when combined with creosote oil—which is a colorless fluid of strong antiseptic qualities, distilled from wood—the properties of coal tar were practically insoluble in water, and that the oil remains in timber after years of submersion as strong as when first injected. This result seems to be the perfection of prevention, for creosoted piles and timber which have been exposed to the teredo for as many as forty years show no evidence of having at any time been attacked, and are as good as when first placed in the water.

It is impossible to say what there is in creosote oil which makes it destructive to animals of cold blood. It seems to those who have studied the matter that, aside from being obnoxious in itself, the creosote oil so changes the appearance and smell of the wood that the teredo fails to recognize it as such.—*N. W. Lumberman.*

The Tomb of St. Francis Xavier at Goa.

This tomb itself must be admired as a masterpiece of art. It surpasses all one's expectations, and it is doubtful whether another mausoleum in the whole of India, or even Asia, excepting the Taj Mahal, could be found to equal it. Its three stages are built of rich marble of variegated colors. The lowest is of red and purple jasper and Carrara alabaster, adorned with statuettes of cherubs. The middle stage is of green and yellow jasper, the principal decorations of which are four beautiful bronze plates representing incidents in the life of the saint. The highest stage is surrounded by a beautiful railing of red jasper marked with white spots. This railing is adorned with figures of angels, and its middle portion is graced with columns elegantly carved, and standing at equal intervals. The intervening spaces are surmounted with arches, and have several incidents in the life of the saint represented on them. The friezes of its four lateral columns are of black stone with white stripes, while the plinths are of yellow jasper. On the top of this stage lies the far-famed coffin, overlaid with silver, in which the remains of the saint are deposited. It is a gorgeous receptacle, divided on each side into seven panels containing some exquisite plates presenting in relief some of the more important incidents in the life of the saint.—*Indian Engineering.*

Building in America.

New York, Brooklyn, and Chicago put up a great many structures in 1890, and made alterations to many others. The three cities spent over $158,000,000 in new buildings, and in New York and Brooklyn the cost of alterations amounted to $9,000,000. Permits were given in New York for the erection of 3,537 buildings, at a total cost of $74,900,812, and plans were approved for alterations in 2,417 buildings at a cost of $7,188,250. In Brooklyn 2,577 permits were issued for the erection of 4,800 buildings to cost $24,334,290, and for alterations in 1,275 buildings at a cost of $1,633,290. In Chicago over 50½ miles of frontage of new buildings were erected and $59,000,000 expended. This is the largest amount ever spent on new buildings in one year in that city, and it is expected that preparations for the fair will keep up the boom. New York and Brooklyn together spent nearly twice as much on new buildings as Chicago, but while the western city spent more than in 1889, New York spent $5,000,000 less, and Brooklyn $2,100,000 less