

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening Nov. 16, 1865, the President, S. D. Tillman, Esq., in the chair.

A PROFITABLE INVENTION.

Mr. Pitkin read a long paper, setting forth the superiority of what is called the factory system of making boots and shoes over the hand system. This system is coming into general use among the shoe manufacturers of New England. The plan formerly practiced was to distribute the work among the farmers' families about the country, who made the shoes mostly by hand, except that portion which could be done by the sewing machine. The invention of a number of machines for fastening on of the soles and heels has led to the adoption of the factory system, by which the hands are brought together in one large building, in which the whole manufacture is conducted. One of the most valuable of these inventions is a machine for sewing the soles; one jaw enters the shoe and the other is on the outside, the thread passing through both insole and outsole, and fastening the two at one operation. The manufacturers pay the inventor the full price for his machine, and then pay him two cents per pair on all shoes sewed by it, for the privilege of using it. One machine will sew 300 pairs of shoes per day; thus yielding a revenue of \$1,800 a year to the inventor for each of his machines in use.

As the necessary skill for attending these machines is acquired by very little training, the work is well adapted for boys, and large numbers of convict children are now employed in the manufacture; the profits are very heavy.

AN INFUSIBLE CRUCIBLE.

Prof. Joy, of Columbia College, exhibited the jet of a compound blow-pipe, as arranged by M. Deville, of Paris, for melting platinum and other refractory substances; a hollow cylinder of copper or platinum, about half an inch in diameter, embraces the jet, and extends about half an inch beyond. M. Deville found that fire clay was melted by the heat of the flame, and he has been trying numerous substances in the attempt to discover one that would make an infusible crucible. The best substance yet tried is quicklime, entirely free from silica and other impurities. The lime is formed into a solid cylinder, by a hydraulic press; the cylinder is sawed in two transversely; the lower part is scooped out to hold the substance to be melted, with a small channel for pouring out the molten mass, and a hole is made in the center of the cover to admit the blow pipe.

A COPPER ALLOY HARDER THAN STEEL.

Prof. Joy also exhibited some pure silicium, and said that he had seen an alloy of this metal and copper, that was harder than steel.

PHARAOH'S SERPENTS.

Finally, Prof. Joy closed his interesting experiments by the wonderful exhibition of the new Parisian toy, called Pharaoh's serpents. In 1821 Prof. Woehler, then a young man at Heidelberg University, discovered that a mass of sulpho-cyanide of mercury, if set on fire, would swell up enormously, enlarging its volume many fold. When Prof. Joy was attending lectures at Heidelberg, he saw the experiment, and has since been in the practice of exhibiting it to his class at Columbia College. Recently, a very ingenious Frenchman has adopted the plan of putting little cones of the substance into boxes, and selling them for a franc apiece. Prof. Joy bought one of these in Paris, and there was a constant stream of people buying them at the same place. The cone, about an inch in height, was placed on a plate and lighted at the top by a match, when it began to burn slowly with a pale flame, and to swell, presenting the appearance of a serpent crawling from out the plate and writhing in painful contortions; this continued for perhaps a minute, when the crooked serpent had reached a length of about a foot, with a diameter of half an inch. In the process, nitrogen is driven off, with a very little sulphide of carbon, and the mass remaining is sulphide of mercury.

ACCORDING to persons of much experience, Brahma fowls are the best for all purposes. They will lay in cold weather when no others will; are fine to eat, and profitable in all respects.

NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

MAGNESIUM FOR VOLTAIC BATTERIES.

M. Bultinck, of Ostend, has communicated to the Academy of Sciences a note on the use of magnesium instead of zinc as the positive element of voltaic batteries. In order to compare the electromotive force of magnesium with that of zinc, he employed two pairs of wires, one pair consisting of a wire of copper and one of zinc, and the other pair of a wire of silver and one of magnesium. On plunging the first-mentioned pair of wires into distilled water, having first connected them with a multiplying galvanometer, the needle of the galvanometer, at the moment of the immersion of the wires, moved 30° , and after the immersion had lasted five minutes still marked 10° . On similarly treating the silver and magnesium pair of wires, which were of exactly the same dimensions as the copper and zinc pair, at the moment of immersion the needle of the galvanometer deviated 90° , and five minutes after immersion it remained stationary at 28° . Having thus found the electromotive force of a magnesium couple to be three times that of a copper and zinc couple, M. Bultinck became desirous to construct a large battery with magnesium as the positive element, but not being able, for the moment, to obtain magnesium in any other form than that of thin wire, he had to be content with making a "galvanic chain" of the kind associated with the name of M. Pulvermacher. Having constructed such a chain of silver and magnesium, he found that when simply moistened with pure water it would produce all the effects the production of which by an ordinary Pulvermacher's chain requires that the chain be moistened with either a saline or an acid solution. We knew previously that magnesium possesses greater electromotive force than any other known metal capable of being obtained in quantity; the new fact brought to light by M. Bultinck is that a battery in which magnesium was the positive element would not need an acid to excite it, but could be excited by water only.

CURIOUS FACTS IN DISTILLATION.

In the course of some researches with respect to the phenomena presented during the evaporation of mixed liquids, Berthelot has lately observed some very remarkable facts, of a kind scarcely to have been anticipated. He has found, for example, that if a mixture of two liquids of different degrees of volatility, containing a preponderating proportion of the less volatile liquid, be exposed to the action of heat, it will by no means always happen that the more volatile of the mixed liquids will fly off first. Thus, if one part of alcohol be added to eleven parts of water, and the mixture be heated, the alcohol will not evaporate any more rapidly than the water, although it is much the more volatile liquid of the two. Stop the evaporation at any stage, and the residue will always contain exactly the same percentage of alcohol that was contained in the mixture before the evaporation commenced. In some cases it even happens that the less volatile constituent of a mixture of two liquids flies off first. If, for instance, a small quantity of alcohol be added to a much larger quantity of that exceedingly volatile compound, bisulphide of carbon, and the mixture submitted to distillation, in the vapors which first pass over there will be a far larger proportion of alcohol than in the mixed liquids as originally placed in the retort, and after a little while there will be left in the retort bisulphide of carbon only, the whole of the alcohol having distilled away, notwithstanding that alcohol by itself is less volatile than bisulphide of carbon, in even greater proportion than that in which water is less volatile than alcohol. Similarly, Mr. Carey Lea has found that when a mixture of ethylamine, diethylamine, and triethylamine is distilled, the last mentioned body, although, when by itself, by far the least volatile body of the three, passes over much more rapidly than either of the others. These facts are very curious, and may prove to have practical bearings of much importance, but in the present state of knowledge they are quite inexplicable.

MECHANICAL POWER FROM THE INTERNAL HEAT OF THE EARTH.

At the last meeting of the Literary and Philosophical Society of Manchester, Mr. George Greaves read a paper embodying the suggestion that the "internal heat of the earth," which he supposes will ren-

der it impossible for us to raise coal from below a depth of four thousand feet, should itself be employed in place of the fuel of which he thinks it will one day cut off our supply. He considers that the heat of the fiery ocean which he believes lies under our feet might supply us with all the mechanical power we want, and that one method of causing it to do this "might be by the direct production of steam power by bringing a supply of water from the surface in contact with sufficiently heated strata, by means of artesian borings or otherwise." He has yet to explain, however, how, supposing his "sufficiently heated strata" to really exist, we could make "artesian borings" deep enough to reach them, or how, even if we could make the borings, we could utilize at the surface the force of steam generated at such a depth below it as that at which even Mr. Greaves must suppose the "sufficiently heated strata" to lie buried.

ARTIFICIAL IVORY.

Both on the continent and in this country the manufacture of "artificial ivory" is conducted on a scale of some magnitude. The process by which the most successful imitation of natural ivory is obtained appears to consist in dissolving either india-rubber or gutta-percha in chloroform, passing chlorine through the solution until it has acquired a light yellow tint, next washing well with alcohol, and adding in a fine powder, either sulphate of baryta, sulphate of lime, sulphate of lead, alumina, or chalk, in quantity proportioned to the desired density and tint, kneading well, and finally subjecting to heavy pressure. A very tough product, capable of taking a very high polish, is obtainable in this way.—*Mechanics' Magazine*.

THE STEAMER "SAXON" AND HER SUBMARINE APPARATUS.

We have just returned from a visit to the steamer *Saxon*, now lying at the foot of Essex street, in Jersey City, with her powerful air pumps, engines, and submarine apparatus, prepared to engage in her work of raising sunken treasures from the bottom of the sea. This apparatus is protected by patents obtained through the Scientific American Patent Agency; it is so simple and practical in its character, and is to be tried on a scale so large, and under circumstances so favorable, as to give the best promise for success.

The submarine armor heretofore used consists of a complete suit of india-rubber, made in one piece for the body, limbs, and hands, and after this is put on it is secured by a water-tight joint to a metallic helmet, so as to inclose the diver in a water-tight case; glass plates are inserted in the helmet in front of the eyes, and the air for breathing is supplied by an india-rubber hose, reaching above the surface of the water. The improvement in the armor secured by one of these patents is the substitution for the hose of a metallic case containing compressed air and attached to the body of the diver, thus giving him far greater freedom of motion, and allowing him to go into parts of a wreck where he could not go if he was attached to a hose leading to the surface. The air is controlled by a valve, and the diver allows it to flow at will into his lungs, and, on being expired, it makes its exit through a valve in the helmet, passing but once through the lungs.

The other patent is for a peculiar buoy for raising sunken ships. This is simply a bag, made of india-rubber canvas, and covered with a rope netting, to be fastened securely to the wreck, and then inflated with air forced into it, by a hose leading from the surface, a sufficient number of the bags being attached to lift the wreck. These bags are made fifteen feet in length, and the netting is made of Italian hemp rope one-fourth of an inch in diameter. Each bag will lift 15 tons.

A company, called the New York Submarine Co., has been formed for working under these patents, with a capital of \$300,000. They have procured a steamer of 450 tons burden, have fitted her out with air pumps and an abundant supply of the apparatus, and have placed her under the command of Captain Samuel H. Holbrook, a man who has devoted his life to raising sunken vessels, having a particular fancy for that work. Capt. Holbrook says that it is impossible to raise vessels from a greater depth than 100 or 120 feet; below that the pressure of the water

causes such a flow of blood to the head of the divers that it is intolerable.

EDITORIAL CORRESPONDENCE.

The President—Pardon-seekers—Condition of the Patent Office—The New Appointment—The New Commissioner—Changes in the Law, Etc.

WASHINGTON, Nov. 23, 1865.

This city has experienced a miraculous change since my last visit. The shoulder-strap gentry, soldiers, flying artillery, the long trains of army wagons, mules, contrabands, and other adjuncts of sanguinary war, have mainly disappeared, and "the city of hacks and magnificent distances" is now restored to the custody of its citizens and office-holders, attended by the usual crowd of hungry office-seekers, and bidders for contracts. Great activity prevails throughout all the departments in anticipation of the early assembling of Congress, at which time, and to which body, the various officials will have to render an account of their stewardship. The man most envied, and most to be pitied, is Andrew Johnson, President of these United States. Though possessed of an iron constitution, capable of great endurance, he has not that elastic element in his nature, which afforded so much relief to his lamented predecessor, who, like William, Prince of Orange, bore the sorrows of a nation upon his shoulders with a smile upon his face. On three different occasions I went to the old White House to see the President for a few minutes upon some important business connected with the Patent Office. Each time I found the halls and ante-rooms, adjoining his private office, thronged with anxious men and women, who either wished to look at, or to get an interview with, His Excellency. By the exercise of a little extra patience and perseverance, on my third visit I succeeded in reaching him. At these interviews, as a matter of courtesy, the women have precedence of the men. Standing near to the person of the President I had a good opportunity, in open court, to learn the nature of several interviews which were accorded to the fair sex. The first one who had the honor of an audience, was a very plainly dressed, elderly woman, attended by a charming creature, who acted as spokeswoman. She interceded with the President in soft, mellifluous tones, for the release of a son of her elder companion, who was pining in durance vile in some government fortress. The President seemed to be moved by the appeal, but replied that in the absence of sufficient knowledge of the case he could not extend Executive clemency. "Surely," said the fair advocate, "you will not refuse me this pardon?" to which the President promptly replied, "I had rather grant twenty pardons than to refuse one," at the same time referring the parties to the Attorney-General. Next in order came a nicely dressed miss, with face closely veiled, carrying in her hand a small package of papers. She seemed not to wish any one but the President to understand the nature of her errand, but from some remarks that fell from his lips, I soon learned that she was seeking pardon for a somewhat aged West Pointer, who had, in some unexplained way, aided the rebellion. The President inquired of her who had examined the case? She replied that Gen. Grant had looked at the papers. The President instantly directed one of his clerks to see what the illustrious man of war had said about it, whereupon the paper was produced, which bore the indorsement of Gen. Grant to the effect that "the case was one of a numerous class well understood by the President." His Excellency then inquired of the young advocate what reason she had for urging the pardon. She replied that the party was anxious to go into some business, and, moreover, that he was deaf. At once the President assured her, that the lack of pardon did not prevent him from going into business, and to grant one would not restore his hearing, at the same time referring her case to the Attorney-General. There were at least twenty women and one hundred men waiting for audience. The President, though affable to all, seemed firm in his purpose not to extend clemency without a clear knowledge of such facts as would warrant its exercise. It is said to be a favorite scheme with many, who are excluded by the terms of the amnesty proclamation, to employ the services of women to present

their cases to the President. These applicants evidently think that mercy

"Becomes the monarch better than his crown."

The situation is certainly far from being an agreeable one to either party.

The President, though appearing quite well, nevertheless exhibits a care-worn and anxious expression. His labors are excessive, and, from motives of mere curiosity, visitors ought not to force their attentions upon him, and just now especially, while he has so many burdens to bear; besides, the White House is a dirty old place, and is not fit for his residence.

I made a somewhat careful examination into the
CONDITION OF THE PATENT OFFICE.

It is the noblest building, architecturally speaking, in Washington. It was originally founded exclusively for a Patent Office, but, upon the creation of the Department of the Interior, its offices were located in the Patent Office building, and the affairs of the office were subordinated to the Interior Department.

The SCIENTIFIC AMERICAN earnestly protested against this arrangement, and the wisdom of this protest is now made as clear as a sunbeam, to all who have taken note of the wonderful progress which has marked the history of invention during the past ten years.

The Patent Office is now finished according to the original plans. Over \$400,000 of the patent fund have been absorbed in its construction, while the office itself has paid all its legitimate expenses out of its receipts. If the business of the office continues for ten years at the same ratio of increase as in the past five years, every available foot of this immense structure will be required for its purposes; and it is to be hoped, in view of this patent fact, that before the close of the next Congress a bill will be passed to establish the Patent Office on an independent basis, and that a proper building for the Interior Department will be authorized. Fifty thousand patents have already been granted, to say nothing of the large number of rejected cases. Models are now rapidly accumulating, and, much sooner than many suppose, the cases now fitted for their reception will be filled. Either the exaction of models must be soon dispensed with or more room will have to be appropriated for their proper care.

Considerable surprise has been expressed that the President should have so long neglected to appoint a suitable person to fill the vacancy in the Board of Appeals, considering the great accumulation of cases before that Board.

Mr. Theaker, formerly a member of the Board, is now Commissioner of Patents. Mr. Coombs resigned some months ago, and has resumed the practice of law in Washington, Mr. Hodges of the old Board alone remained. Judge Foote, a most excellent and competent man, has just entered upon the duties of the Board, and will do good service. Four chief examiners in the Patent Office—Dr. Page, Mr. Blanchard, Mr. Peale, and Dr. Doane—were applicants for this position, and were each strongly recommended by their friends, but I understand that the President has at last found the right man for the right place, in the person of Mr. Fessenden of Maine, brother of Senator Fessenden, to fill the vacancy.

Respecting the new incumbent, I have been unable to learn anything definite as to his qualifications. He belongs to a family distinguished for ability and practical good sense. The Board has plenty of legal ability, and it is to be hoped that Mr. Fessenden will bring to its aid the mind of a well-instructed and experienced mechanic.

THE NEW COMMISSIONER.

Commissioner Theaker possesses a full and thorough knowledge of his duties. He well deserves the confidence and cheerful support of the whole clerical force of the office. No man who has ever filled that important chair brings to its duties a higher purpose to discharge its trust more faithfully and earnestly; and now that the vacancy in the Board of Appeals is filled, I trust that he will reclassify the whole business of the office, so that the labors may be more equitably distributed.

Some of the examiners are overworked, for want of proper assistants, while others have not enough to do; hence, while in some classes the work is well up, in others there is an unusual accumulation of

cases. If there are any drones in the hive they ought to be expelled, and it would be an act of well-merited justice to promote some of the assistant examiners who have so long and faithfully discharged the duties of principals.

I trust that the Commissioner will resolutely use his influence to promote these much needed reforms and changes. The duties of chief clerk are now ably performed by Thomas Harland, Esq., of Norwich, Conn.

I understand that Mr. Jenckes, who was Chairman of the House Committee on Patents during the last Congress, and who is quite likely to occupy the same position in the next Congress, is now engaged in preparing a bill designed to establish the Patent Office as an independent bureau, and also to secure some other changes in the law of patents.

I do not know what Mr. Jenckes contemplates in the way of changes in the law, but trust he will act in such matters in consultation with the Commissioner. This would insure inventors against radical changes in the present admirable system of granting patents.

The business of the office was never so large as now. During the month of October 628 patents were issued, and upward of 500 will probably issue during the month of November. I think the records will show that fully one-third of the whole were clients of the Scientific American Patent Agency—the balance being divided between hundreds of local agencies in the various cities of the Union. ***

New Chain Machine.

A novel and ingenious invention has been brought out in England by which the production of chains is greatly facilitated, at the same time that the strength of the article is increased, and the price reduced. The process may be described as follows:—The end of the bar of iron, as it comes hot from the rolls, is placed in the machine, which coils it upon a mandrel, having the shape of the inside of the link required. A sliding rest, moved by a screw, distributes the bar of iron upon the mandrel, forming what is technically called a helical coil, having a 3-inch pitch. By a simple arrangement the coil is then pushed off the mandrel on to the bar connected with the shears, where a peculiar form of steeling allows the coil to be cut obliquely, so as to form a scarfed joint, and the link, when cut, to fall off, or to be moved. The link is then taken to the welding press, where it is closed, welded, finished, and the stud put in by pressure in metal dies. The violent exertion of welding with heavy sledge hammers, producing an intermittent and uncertain concussion so injurious to the fiber of the iron, is done away with, and an instantaneous pressure over the whole surface of the joint is substituted. The superiority of this system of manufacture seems to be palpable; the saving effected in labor is from 50 to 75 per cent. The inventor is Mr. George Homfray, of Hales Owen.—*The Ironmonger.*

Important to Southern Inventors.

Secretary Harlan has issued the following instructions to the Hon. Thomas C. Theaker, Commissioner of Patents:—

"The subject of granting patents to the citizens of States recently in rebellion has been submitted to the President, and I am instructed by him to direct that no patent be granted to any resident of a district declared by the President to be in a state of rebellion without satisfactory proof of loyalty is furnished, embracing the original or an authenticated copy of the amnesty oath as taken by said resident; and if parties making application for patents belong to the excluded class, evidence of their special pardons by the President should be furnished.

JAS. HARLAN, Sec'y of Interior Department."

An extensive coal field has just been discovered at the foot of Mount Olympus. The coal is said to be well adapted to steam purposes, and is so abundant that it can be sold for \$2 per ton. It is intended to establish a depot of the coal at Suez for the supply of the steamers.

By the spectrum analysis Bunsen was able to detect the 70,000,000th part of a grain of lithium in a compound; while of sodium the 180,000,000th part of a grain could be made perceptible.