POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening, April 7th; the President, S. D. Tillman, Esq., in the chair.

THE ORIGINATOR OF SHELL GUNS.

Miscellaneous business being in order, the meeting was addressed as follows by—

Mr. Maynard—"Mr. Chairman, I see by the published reports of the proceedings that it was stated here by Mr. Heaton that the practice of horizontal shell-firing was inaugurated by the Russians. This is a mistake. During the administration of Jefferson, Col. Bomford devised a large gun—9-inch caliber—to throw shells horizontally; and he proposed to have it adopted in our service. The proposition was declined by the President, though a gun and shells were cast. Col. Paixhan, of the French service, saw the gun here, and through his influence it was adopted in France, receiving the name of the Paixhan gun. It was afterward adopted for our fortifications, and received the name originally proposed by Col. Bomford, the 'Columbiad.' Capt. Dahlgren made a series of experiments to determine the pressure in different parts of the gun, which showed that the metal should be differently distributed—a much larger proportion being required at the breech, and less about the muzzle. Guns were accordingly cast from Capt. Dahlgren's drawings, and these were called Dahlgren guns. These guns have been for many years the principal armament of our navy."

Mr. Dibbin:—"The chambers which Col. Bomford proposed in the breech of the guns have been abandoned, and all of the large guns are now cast without chambers in the breech."

No other miscellaneous business being offered, the President proceeded to read his weekly summary of scientific and industrial news, from which we select the following items :—

CHANGES IN CHEESE.

M. Blondeau has examined the changes produced in Roquefort cheese when stored away in cellars to acquire the flavor which recommends it to the taste of some people. He found fresh cheese contained—casein 85.43, fatty matter 1.85, lactic acid .88, water 11.84, total 100.

After being two months in a cellar, similar cheese contained—casein 42.28, margerin 18.30, olein 14.00, butyric acid .67, salt 4.45, water 19.30, total 100.

The remarkable change of casein into margerin and olein, the author believes, is due to a mycoderm of the genus *Penicillium*. The proportions of the last-named compound being nearly those found in butter, he concludes that butter is formed in the animal economy at the expense of casein.

WOLFRAM OR TUNGSTEN.

M. Le Guen states that his experiments prove that wolfram up to 2½ per cent. increases the hardness and tenacity of iron. Beyond this proportion it is prejudicial.

CALABAR.

Messrs. J. Jobst and O. Hesse, of Stuttgard, have published their researches made to ascertain the active principle of calabar, or the ordeal bean, used by the natives of Upper Guinea for testing the guilt of prisoners. They have succeeded in obtaining from the bean very minute quantities of an alkaloid which they call phytostigmin, in which the poisonous quality resides. It may be interesting to the medical jurist to know that two drops of this substance introduced into the eye of a rabbit, which was not killed by the poison, caused the pupils to contract one-fourth, while the eye of the rabbit poisoned by the alkaloid was not perceptibly affected. The eye of one poisoned by cyanide of potassium in scarcely contracted at all.

NEW SPECIES OF ANIMALS.

Among the 38 species of mammals, collected by Capt. Speke in Eastern Africa, is a new antelope, and of 60 varieties of birds 5 are new.

PHOTOGRAPHS AND MEMORY.

The distinguished Dr. Draper, of the New York University, in a late discourse thus speaks of the impressions made by light :—

"If after the eyelids have been closed for some time, as when we first awake in the morning, we suddenly and steadfastly gaze at a brightly illuminated object, and then quickly close the lids again, a phantom image is perceived in the infinite darkness before us. We may satisfy ourselves that this is not a fiction of the imagination, but a reality ; for many details that we had not time to examine in the momentary glance, may be contemplated at our leisure in the phantom. We may thus make out the pattern of such an object as a lace curtain hanging in the window, or the branches of a tree beyond. By degrees the image becomes less and less distinct; in a minute or two it has disappeared. It seems to have a tendency to float away in the vacancy before us. If you attempt to follow it by moving the eye-ball, it suddenly vanishes.

"Now the condition that regulates the vanishing phantom-images on the retina is, that when they have declined in vigor to less than $\frac{1}{64}$th of the intensity they had while in presence of the object that formed them, they cease to disturb the sight. This principle is illustrated when a candle-flame is held opposite to the sun, or any light having more than 64 times its own brilliancy. It then ceases to be visible. The most exact of all known methods for measuring light—that by the extinction of shadows—is an application of the same principle.

"But the great fact that concerns us is this :—Such a duration of impressions on the retina of the eye demonstrates that the effect of external influences on nerve vesicles is not necessarily transitory. It may continue for a long time. In this there is a correspondence to the duration, the emergence, the extinction of impressions on photographic preparations. Thus I have seen landscapes and architectural views taken in Mexico, 'developed'—as artists say—months subsequently; the images coming out, after the long voyage, in all their proper forms and in all their contrast of light and shade. The photograph had forgotten nothing. It had equally preserved the contour of the everlasting mountains and the passing smoke of a bandit fire.

"Are there then contained in the brain more permanently, as in the retina more transiently, the vestiges of impressions that have been gathered by the sensory organs? Do these constitute the basis of memory—the mind contemplating such pictures of past things and events as have been committed to her custody. In her silent galleries are there hung micrographs of the living and the dead, of scenes that we have visited, of incidents in which we have borne a part? Are these abiding impressions mere signal-marks, like the letters of a book, which impart ideas to the mind, or are they actual picture-images, inconceivably smaller than those made for us by artists, in which, by the aid of a microscope, we can see, in a space not bigger than a pin-hole, a whole family group at a glance?

"The phantom-images of the retina, as I have remarked, are not perceptible in the light of day. Those that exist in the sensorium, in like manner, do not attract our attention so long as the sensory organs are in vigorous operation, and occupied with bringing new impressions in. But when these organs become weary and dull, or when we experience hours of great anxiety, or are in twilight reveries, or asleep, the latent apparitions have their vividness increased by the contrast, and obtrude themselves on the mind. For the same reason they occupy us in the delirium of fevers, and doubtless also in the solemn moments of death. During a third part of our lives we are withdrawn from external influences—hearing, and sight, and the other senses are inactive; but the never sleeping mind—that pensive, that veiled enchantress, in her mysterious retirement, looks over the ambrotypes she has collected—ambrotypes, for they are unfading impressions—and combining them together as they chance to occur, weaves from them a web of dreams. Nature has thus introduced into our very organization a means of imparting to us suggestions on some of the most profound topics with which we can be concerned. It operates equally on the savage and on the civilized man, furnishing to both conceptions of a world in which all is unsubstantial. It marvelously extracts from the vestiges of the impressions of the past overwhelming proofs of the reality of the future, and gathering its power from what might seem a most unlikely source, it insensibly leads us—no matter who or where we may be—to a profound belief in the immortal and imperishable, from phantoms that have scarcely made their appearance before they are ready to vanish away!"

STEAM CARRIAGES.

The remainder of the evening was spent in listening to remarks from Mr. Nash on a variety of subjects, and to a paper from Mr. Fisher in which he advocated a new grading of the city of New York, the paving of the streets with plates of iron, the prohibition of the use of horses, and the substitution of steam carriages in their place. It was argued that with level streets there would be a large saving of the traction power required in removing merchandise from one part of the city to another, and that with iron pavements and without horses the streets would be cleaner and freer from dust, and the sidewalks would be more agreeable for pedestrians.

The "Utilization of Waste Products" was selected as the subject for the next meeting, and the Association adjourned.

Pleuro-Pneumonia.

Mr. Charles L. Flint, Secretary of the Massachusetts Board of Agriculture, has recently published a pamphlet of 15 pages on the above-named subject, after having visited the countries of Europe where the disease prevails. He makes the following startling statements:—

The most moderate estimates fix the loss by pleuro-pneumonia alone, in the British Isles, at ten millions of dollars a-year. The value of cattle, lost by this disease, amounts to two or three times the value of all the cattle imported. More than a million head of horned cattle died of pleuro-pneumonia in the six years ending 1860, of a value of at least sixty millions of dollars. Immense amounts of diseased meat are constantly offered and sold in the markets of England. More than nineteen tuns were detected in the London market in one week, in the summer of 1862. One inspector (of markets) said that if he were called upon to exclude from market animals affected with contagious diseases, he must exclude two thousand animals out of Islington market on many a Monday morning. The effects of this diseased meat are already discoverable in the impaired health of those who consume it. The disease is highly contagious. The most distinguished veterinary surgeons in the world now agree on this subject.

It still prevails to some extent in Massachusetts. On this point, Mr. Flint remarks:—"The disease still exists among the herds of some twelve or fifteen towns of this Commonwealth. The importance of an early consideration of the facts connected with its introduction and spread can hardly be overstated, whether we regard it in a pecuniary or in a sanitary point of view. If we are to give up all effort to eradicate it, we must settle down into the conviction that we shall soon find ourselves in the condition of those countries in Europe where this disease exists, and from which it is now probably too late to attempt to get rid of it, owing to the fabulous amount of the cost."

The First Striking Clock.

In the time of Alfred the Great, the Persians imported into Europe a machine which presented the first rudiments of a striking clock. It was brought as a present to Charlemagne from Abdallah, king of Persia, by two monks of Jerusalem, in the year 800. Among other presents, says Eginhart, was a horologe of brass, wonderfully constructed by some mechanical artifice, in which the course of the twelve hours *ad clepsydram vertebatur*, with as many little brass balls, which, at the close of each hour, dropped down on a sort of bell beneath, and sounded the end of the hour. There were also twelve figures of horsemen, who, when the twelve hours were completed, issued out of twelve windows, which till then stood open, and returning again, shut the windows after them. It is to be remembered that Eginhart was an eye-witness of what is here described ; and that he was an abbot, a skillful architect, and learned in the sciences.

IRON CEMENT.—To make an iron cement suitable for making rust joints, mix thoroughly 112 lbs. of clean cast-iron borings or turnings, with 8 ounces of sal-ammoniac, and 1 ounce of flour of sulphur, and add sufficient water. Keep wet when not to be immediately used, or it will heat and be spoiled.

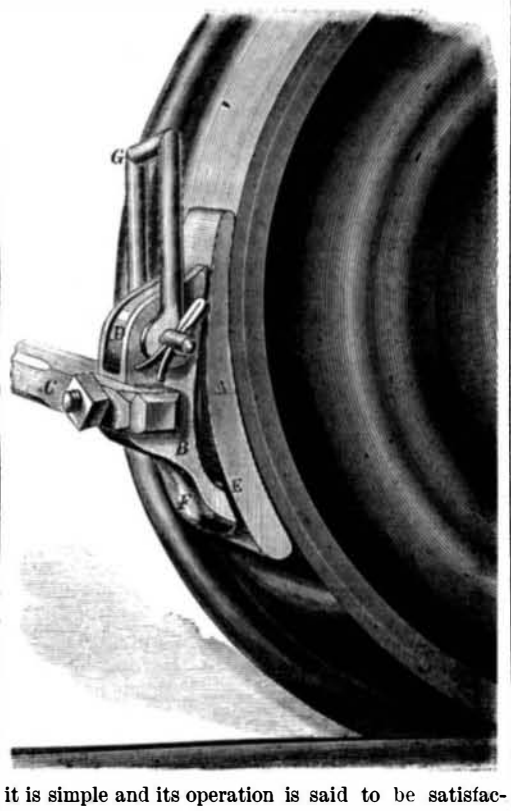
Effects of a Ninety-pound Charge.

The following account of the most powerful shot yet made is from the London *Times*. The gun is of wrought iron with a caliber of 13⅓ inches, just about the same as that of Ericsson's wrought-iron guns which are to be used in arming the *Dictator* and *Puritan:*—

"A curious and important experiment took place at Shoeburyness last week, to test the powers of the greatest gun yet forged by Sir William Armstrong against one of the thickest plates which Messrs. John Brown & Co.'s eminent firm have yet produced for actual armor-plating. The gun was the celebrated "Big Will," the 600-pounder, about which so many *canards* have been in circulation as to its having given way at the breech, &c., for all of which there has not been the slightest foundation. This magnificent piece of ordnance had only been fired twenty times, each time with the most prodigious result, and after the great experiment of Thursday it was as perfect inside and out as the day it left the factory at Elswick. The mass of iron, for it can hardly be called a plate, against which it was tried on Thursday was no less than 11 inches in thickness—a sample of one of many of the same enormous strength made by Messrs. Brown & Co., for the Russian Government, to plate the sea faces of some of the most important and exposed of the Cronstadt forts. According to the theory of the iron plate committee, that the strength of an iron plate increases as the square of of its thickness, the 11-inch mass, tried on Thursday, was equal in strength to no less than six plates of the famous *Warrior* target ; yet before the experiment commenced, not the slightest doubt was entertained that the 600-pounder would utterly smash it, if fired with a 600 lb. shot. The real interest of the experiment consisted in ascertaining—first, whether the same destructive result would be gained by using the gun as a smooth-bore, with a steel shot of half the weight; secondly, how the gun would stand the tremendous charge of 90 lbs. of powder; and thirdly, whether the fracture of the plate would show that even Messrs. Brown could manufacture one of 11 inches in thickness perfect throughout. These were the three points really at issue, and the solution of these was looked forward to with keen interest by all the officers on the ground. The first and only shot, we are happy to say, settled them all in the most satisfactory manner, and proved the enormous advantage of steel shot, the strength of the gun, and the excellent manufacture of the plate. The plate or slab of iron was 4 feet long by 3½ feet wide, and was unimpaired in its strength by a single bolt-hole or fastening. It was held up vertically against two 12 inch beams of solid oak, to which it was fastened by railway iron, passing up its face on either side. Behind it, and in support of the oak beams, was the Fairbairn target of 5 inch plates and a 1 inch inner skin, with the usual massive framework of iron rib beams. This target, however, did not support the plate to be fired at, but only the beams of oak which held it in position. There was an interval of 12 inches between the plate and the Fairbairn target, which was left purposely that the former might do its own work, if it could, unaided. The proceedings were commenced by firing two cast-iron round shot of 300 lbs. weight, levelled at 200 yards range, against a "dummy" target placed close alongside the 11-inch plate, for the purpose of determining the exact degree of elevation to be given to the gun. Both these were fired with the enormous charges of 90 lbs. of powder. Such charges, even with 600-pounders, would not be used in actual warfare, and for experimental purposes like that of Thursday were objectionable, as it seemed to make it almost as much an effort to destroy the gun as the target. To load "Big Will" with a sack of powder, such as two men could scarcely lift into its muzzle—such a sackful as it was never built to withstand, and such as it would not be loaded with in service—seemed, as an experiment, almost childish. The gun stood it perfectly to all outward seeming; but those conversant with the nature of wrought iron knew very well that the piece is so much the worse for the ordeal through which it has now been forced, and that they have, if anything, less confidence in "Big Will" after such a straining than they had before it was tested at all. Our system of testing wrought-iron guns is condemned, without an exception, by the artillery officers of all other nations in the world. The precise range having been ascertained, "Big Will" was again stuffed with a sackful of powder, but, instead of a cast-iron projectile, was loaded with a steel round shot of 344 lbs. weight, and levelled against the target. This shot struck the very center of the plate with a terrific crash, at a velocity of 1,560 feet, and at one blow closed the experiments for the day. Nothing further remained to be accomplished, for the target was gone. Never, probably, has a more tremendous blow been struck by human agency. The mass of steel driven by the tremendous charge of powder must have struck the target with a power almost inconceivable, for everything went down before it. The solid oak beams behind the plate were crushed into splinters, and the plate itself hurled bodily back against the Fairbairn target and split into two pieces—one huge piece being flung away to the right and the other to the left, and all this before the shot had time to penetrate to a greater depth than 4½ inches. The 11-inch plate, in fact, had not sufficient stability to receive the blow aimed at it; it was torn apart by the tremendous force with which it was jammed against the Fairbairn target behind, and an examination of the fracture showed that its manufacture was admirable. Fourteen feet in front of the target lay the steel shot, much flattened, and cracked, but evidently as good metal of its kind as Mr. Brown's plate itself. A close examination of the gun was next made by the Inspector of Artillery, and it was found to be wholly uninjured. Notwithstanding the use of steel round shot in a rifled gun, the grooves of the rifling remained as sharp and fine as ever, and only one feeling seemed to be entertained on the ground as to the strength of the gun and the excellence of the plate."

BING'S BRAKE SHOE.

This engraving represents a new shoe for car brakes; it is designed to act more efficiently than those ordinarily in use, to wear much longer and require less attention and repair. The construction of



it is simple and its operation is said to be satisfactory. The shoe, A, itself is of metal and is carried in a bracket, B, to which the brake beam, C, is attached. It will be seen that the lug, D, on the shoe is tapered where it enters the bracket, and that the shoe has a spur at E, which fits in a recess in the under part of the bracket at F. From this peculiarity the shoe always accommodates itself to the cone-like face of the car wheel, and acts as efficiently when rounding curves as when running on a straight line. This is not the case with the old brakes, which are rigid or fixed and at times present but a small portion of the bearing surface to the tread of the wheel. The clevis, G, is attached to the car as usual, and the bolt that runs through it is easily fitted so as not to cramp it. These shoes are made right and left to suit different sides of the cars, and are highly spoken of by those who have used them. The inventor says:—

"In the manufacture of my shoe there is a saving of at least fifty per cent; it can be secured in its place, or removed, in two or three minutes, and will wear much longer than the ordinary shoe, as it bears with its entire surface against the face of the wheel the moment the brake is applied. As the shoe is capable of a slight vibration, much of the strain is removed from the bolt which secures it to the brake beam, and the bolt does not therefore work loose as in ordinary shoes. This shoe has been tried on the West Chester and Philadelphia Railroad, and also no several of the passenger railroads in Philadelphia. The engineers on all the roads speak of it very highly and are about to place it on all their cars. In four months' trial on the Pennsylvania Central Railroad, my shoe outlasted two of the ordinary shoes. After the trial my shoe had worn away to five pounds, whereas, when the ordinary shoe had to be replaced by a new one, its weight was twelve pounds, the difference being that with my shoe but five pounds of waste iron were left after four months' trial, while in the other case, duriug the same time, twenty-four pounds of waste iron were left."

The patent for this invention was procured Oct. 6, 1863, by James Bing, of Philadelphia, Pa.; for further information address him at No. 2,222 Mt. Vernon street, Philadelphia.

How to prevent Wet Feet.

A writer in the *Mechanics' Magazine* says: "I have had three pairs of boots for the last six years, and I think I will not require any more for the next six years to come. The reason is that I treat them in the following manner: I put a pound each of tallow and resin in a pot on the fire; when melted and mixed, and apply it hot with a painter's brush until neither the sole nor upper will soak any more. If it is desired that the boots should immediately take a polish, dissolve an ounce of wax in a teaspoonful of turpentine and lampblack. A day or two after the boots have been treated with the resin and tallow, rub over them this wax and turpentine, but not before the fire. Thus the exterior will have a coat of wax alone and shine like a mirror. Tallow and grease become rancid, and rot the stitching or leather; but the resin gives it an antiseptic quality, which preserves the whole. Boots or shoes should be so large as to admit of wearing cork soles. Cork is so bad a conductor of heat that with it in the boots the feet are always warm on the coldest stone floor."

Sensible Maxims.

Never taste an atom when you are not hungry; it is suicidal.

Never hire servants who go in pairs, as sisters, cousins, or anything else.

Never speak of your father as "the old man."

Never reply to the epithet of a drunkard, a fool, or a fellow.

Never speak contemptuously of womankind.

Never abuse one who was once your bosom-friend, however bitter now.

Never smile at the expense of your religion or your Bible.

Never stand at the corner of a street.

Never insult poverty.

Never eat between meals.

SPECIAL NOTICES.

THEODORE ALTENEDER, of Philadelphia, Pa., has petitioned for the extension of a patent granted to him on July 16, 1850, for an improvement in joints for compasses for measuring.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, June 13, 1864.

FREDERICK M. BUTLER, of New York City, has petitioned for the extension of a patent granted to him on July 22, 1850, for an improvement in truss pads.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, July 11, 1864.

All persons interested are required to appear and show cause why said petitions should not be granted. Persons opposing the extensions are required to file their testimony in writing, at least twenty days before the final hearing.