POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The regular weekly meeting of the Association was held at their rooms at the Cooper Institute on Wednesday evening, April 17th, the President, Prof. Joy, in the chair.

SALTING THE STREETS.

Prof. SEELY—There was one point made by Dr. Gardiner at the last meeting which perhaps ought to have been considered at our first discussion of this subject—that is, whether we want snow in New York city. In regard to that I would say that for those who have the means to purchase fine horses and sleighs, and the leisure to indulge in the recreation, sleigh-riding is a very agreeable luxury. I like it very well myself. But I cannot afford to indulge in it, and I have no doubt that in this city there are a thousand persons like myself in this respect to one who can enjoy sleigh-riding; and I think that the few should be willing to give way to the many. Even for those who have sleighs the streets are not very good places to ride in, and most of those who indulge in the recreation go into the suburbs or out of town. This subject has recently been thoroughly investigated in Philadelphia. It being proposed to prohibit the use of salt on the railrods, a committee was appointed by the city government to take testimony and fully investigate the matter. The College of Physicians and the Board of Health were both called upon for their opinions, and all citizens interested were invited by public notice to present their views. The testimony was very contradictory, but it seems to me that the preponderance is decidedly in favor of the practice. The strongest opinions are in opposition to it, but these are generally given by those least competent to judge. The College of Physicians made a series of observations for the guidance of their judgment. Dr. Rogers tested the temperature of the salt slush in many places, and he walked through the streets with a thermometer in his hand, carrying it about three feet above the ground. He found the slush but very few degrees colder than the snow—three, four, five and in one case eight degrees colder; and the temperature of the lowest stratum of the air was in no case any lower than that at the hight of five or six feet. Both Boards gave their opinion in favor of allowing salt to be used, and no physician objected to it.

Since the last meeting I have very fortunately had an opportunity of making some experiments myself. We had a slight fall of snow and I prepared some mixtures of it with salt in different proportions and observed the temperatures and the rate of melting. I placed in my laboratory 4 tin cans, all of the same size—6 inches in diameter and 8 inches in hight. In each of these I placed 20 oz. of snow, carefully weighed. In one of the cans which I call No. 1, I mixed with the snow 10 oz. of salt, in No. 2 I mixed 1 oz., in No. 3 one-fifth of an ounce, and in No. 4 I left the snow pure without any mixture of salt. It will be seen that in No. 1 the proportion of salt was 50 per cent of the weight of snow; in No. 2, 5 per cent and in No. 3, 1 per cent, the last being about the proportion in which it is used in the streets. I tried the temperatures of the mixtures with a thermometer at several periods during the day, with the following results:—

	A. M.				P. M.			
	9:15	9:45	10:45	11:45	12:45	1:45	4:00	Salt. Snow.
Temp. of air,	47°	50°	52°	55°	58°	56°	60°	— —
Can No. 1, temp.	—4°	—3°	—1°	18°	*30°	39°	48°	10 oz. 20 oz.
Can No. 2, temp.	0°	5°	7°	18°	21°	27°	43°	1 oz. 20 oz.
Can No. 3, temp.	4°	19°	22°	28°	28°	30°	*31°	⅕ oz. 20 oz.
Can No. 4, temp.	32°	32°	32°	32°	32°	32°	†32°	0 oz. 20 oz.

* No Snow. † Much snow still unmelted.

The 4° below zero entered in the memorandum as having been observed at 15 minutes past 9, A. M., is a mean from observations in different parts of the vessel. In some parts it was —6°, which was the lowest temperature noted. The snow was unfortunately damp, and it was impossible to mix the salt with it as thoroughly as would have been desirable. It will be seen from the table that No. 1 was all melted at 12.45, P. M., and Nos. 2 and 3 at 4 o'clock, P. M. When I left at 6 o'clock a considerable portion of the snow in No. 4 remained unmelted. The temperature was in this case reduced much more than it would be if the salt was sprinkled upon the surface of snow lying upon the ground. Here the salt was all through the mass, and could obtain heat only at the outside, while if it wa sprinkled upon the surface it would form a thin sheet which could readily obtain heat from the air above and from the ground below. This would also cause the snow to melt more slowly in my experiment than it does upon the ground. I have no doubt that one per cent of salt, if judiciously used, will carry off the snow in one fourth of the time in which it would usually be removed by our winter weather. I am still of the opinion, Mr. President, that the use of salt under intelligent direction, for the removal of snow, will tend to promote the comfort and health of our citizens.

Capt. BARTLETT—Mr. President, this is simply a question of dryness. If you wet your boots with salt water they will remain moist a long time, but if you wet them with fresh water they will soon dry. [The gallant Captain then cited many facts drawn from his experience in the navy to show that the wearing of wet clothes is exceedingly injurious to health.]

Prof. SEELY—It is true that clothes wet with sea water will remain moist longer than if wet with fresh water; but this is not the case with salt and water. There are salts in the sea which absorb and retain moisture, but chloride of sodium is not hygroscopic.

Mr. FISHER—Mr. President, I took the ground, on a former occasion, that people were willing to pay for luxuries, and that it would be better to cart the snow out of the streets; but as we have a great park in which the snow is carefully kept in the best condition for sleigh-riding, perhaps it would be best for those who would enjoy this luxury to go to the Central Park, or to the suburbs, while the snow may be removed as quickly as possible from the streets. [The speaker then made an argument in favor of using steam on the city railroads and on common roads.]

Mr. EBBETT—Mr. President, I appear here on the part of the railroads, or at least one of them—the Sixth Avenue. I have had a great deal of experience in using salt, and in attempting to clear the track without it. The railroads do not desire to use salt for their own profit, but simply for the convenience of the public. When the tracks are obstructed with snow, we are obliged to double our teams and run half the number of cars, thus cutting off nearly half of our receipts while our expenses remain the same. This crowds the cars and forces a great many people to walk when the walking is the most disagreeable. I have been up three nights in succession, working day and night, to get the tracks clear so that we can make our regular trips. Nothing creates so much dissatisfaction as a failure to make our trips in time.

The great number of horses that were injured in February, last year, were not injured by salt. The last time that salt was used was on the 1st of February and the horses were injured on the 8th. I remember the day very well. In the morning there was a dense fog, so dense that it was impossible to see across the street. At noon the sun came out for a little while, and then it grew suddenly very cold. At night it was some six or seven degrees above zero. Our horses that worked in the forenoon were uninjured, but of those that worked in the afternoon 61 were found the next morning to be lame, some in one foot and some in another. The injured feet were white and presented the appearance of having been frozen.

There are men on our road who have worked many years, always standing in the water when salt is used to melt the snow, and none of them have been injured. I brought along one of our starters, Mr. More, a man of delicate health, who will give his experience.

Mr. MORE—I have worked on the railroad, and for the last six years we have used salt for removing snow. I stand at the station 12 hours in the day, from 6 o'clock in the morning till 6 at night. I used to be much subject to colds, but for a few years have been quite free from them. I think that standing in this salt water is a good thing for the health.

The subject of surface condensers was selected for a fortnight hence, and the meeting adjourned.

THE quantity of rice consumed in the rice-eating countries of the East has been estimated at three ounces per day for each person, or seventy pounds per year. The population of these countries is estimated at 671,343,916 souls, and the rice crops at 62,176,062,000 pounds, 50 per cent greater than the Indian corn crop of the United States.

ANILINE has not been obtained from petroleum; thus proving that the latter does not contain benzole from which aniline is made.

THE DISCOVERIES OF 1861.

At the close of each year for several years, David A. Wells, A. M., has published a volume containing an account of all the important discoveries in science and art made during the year. The periodicals of England and the continent of Europe, as well as of this country, are carefully watched, and the mention of every new discovery is extracted. The book usually contains about 400 pages, and a copious index renders it a most convenient work for reference.

We have already mentioned the appearance of the volume for 1861, and we now select some of the most interesting of its items, which will give a good idea of the character of the work:—

CRYSTALLINE STRUCTURE OF IRON INDUCED BY VIBRATION.

The spontaneous change forged and rolled iron undergoes when submitted to continuous vibration, is productive of so much critical danger, especially in the case of railway machinery, that an investigation into the best means of remedying the resulting evils has been viewed as an engineering question of vital importance. Among others, Mr. Schimmelbuch, of Liege, has undertaken the subject, and the following is an epitome of his investigations: A bar of pure unalloyed iron was struck by a hammer three times in a minute for six consecutive weeks; at the expiration of this time it broke into three pieces. Before the experiment the bar was a good specimen of fibrous iron; after, on the contrary, its fracture exhibited a brilliant crystallized structure, resembling that of antimony.

A bar of iron alloyed with nickel, submitted to the same treatment, underwent no change.

A very simple means exists of recognizing this changed condition of iron, so dangerous in its consequences. Pure iron, when magnetized by contact, loses its magnetic properties immediately the needle is detached. On the other hand, iron combined with minute quantities of some foreign body, such as carbon, oxygen, sulphur or phosphorus, remains magnetized. The efficacy of this simple test has been established by repeated experiments.—*London Photographic News.*

Under the patronage of the Austrian government M. Bourville has also recently instituted a course of experiments with a view of throwing some additional light on the subject of the induction of a crystalline structure in wrought iron through vibrations.

M. Bourville's apparatus consisted of a bent axle, which was firmly fixed up to the elbow in timber, and which was subjected to torsion by means of a cog-wheel connected with the end of the horizontal part. At each turn the angle of torsion was twenty-four degrees. A shock was produced each time that the bar left one-tenth to be raised by the next. Seven axles were submitted to the trial. In the first the movement lasted one hour, 10,800 revolutions, and 34,400 shocks being produced; the axle, two and six-tenths inches in diameter, was taken from the machine and broken by a hydraulic press, and no change in the texture of the iron was visible. In the second, a new axle, having been tried four hours, sustained 129,000 torsions, and was afterward broken by means of a hydraulic press; no alteration of the iron could be discovered by the naked eye on the surface of rupture, but. tried with a microscope, the fibres appeared without adhesion, like a bundle of needles.

A third axle was subjected, during twelve hours, to 338,000 torsions, and broken in two; a change in its texture and an increased size in the grain of the iron were observed by the naked eye. In the fourth, after one hundred and twenty hours, and 2,588,000 torsions, the axle was broken in many places; a considerable change in its texture was apparent, which was more striking toward the center, and the size of the grains diminished toward the extremities. In the fifth, an axle was submitted to 23,328,000 torsions, during seven hundred and twenty hours, was completely changed in its texture; the fracture in the middle was crystalline, but not very scaly. In the sixth, after ten months, during which the axle was submitted to 78,732,000 torsions and shocks, fracture produced by a hydraulic press showed clearly an absolute transformation of the structure of the iron; the surface of rupture was scaly, like pewter. In the seventh and final case, an axle submitted to 128,304,000 torsions presented a surface of rupture like that in the preceding experiment: the crystals were found

to be perfectly well defined, the iron having lost every appearance of wrought iron.

NEW KIND OF ELECTRIC CURRENT.

When pure water flows through a porous body, an electrical current is elicited; a fact established by experiments, says M. G. Quincke, which may be stated concisely in these terms:—

Some thirty layers of thin silk stuff were placed over each other and attached over one tube of the apparatus; another tube was then adapted against the former, and the part separating them covered thickly with sealing-wax. Owing to the wide pores of the silk, considerably more water flowed through, under equal pressure, than when the clay plate was employed. The linen was used in the same manner.

The other substances were applied in the form of powder, in a glass tube of the diameter of the above tubes. The ends of these tubes, the length of which varied, according to the substance employed, from twenty to forty-five millims., were ground flat, and over them were placed disks of the silk stuff spoken of, to prevent the flow of the fluid carrying away particles of the substance under examination. In the case of Bunsen's coil, the tube was closed with plates thereof.

Platina was made use of in the spongy form, iron as filings. The glass had been reduced to powder on an anvil. Ivory and the various kinds of wood were employed in the form of sawdust. It was endeavored in vain to press water through a porous plate of wood, for the plate had to be luted in dry; and on becoming moist, even if cut perpendicular to the direction of the fibres, it warped so much that it broke the sealing-wax or the tube.

The direction of the electric current was not changed by adding acids or solutions of salts to the distilled water, but it was considerably weakened thereby.—*Poggendorff's Ann.*

ELECTRICITY GENERATED BY EVAPORATION.

Mr. Palmieré, in a note in the *Cosmos* (Paris), states that in order to obtain electricity by condensing vapors, he had some water in a capsule of platina, not insulated, made to boil slowly. He collected the vapor upon a platinum refrigerator, at a hight of about two feet above the surface of the water, and by means of a condensing electroscope soon convinced himself that the vapor manifested positive electricity. Encouraged by this result, he sought to discover the negative electricity in the capsule of platinum which contained the water in a state of vaporization. Having isolated the capsule, and put it in connection with a condensing electroscope, he concentrated the solar rays on the distilled water in the capsule by means of a lens about a foot in diameter. He thus obtained a superficial ebullition, hardly visible, and also indications of negative electricity in the capsule. He afterward varied the mode of experimenting, and operated on different liquids.

WHAT IS HEAT LIGHTNING?

The flashes of lightning often observed on a summer evening, unaccompanied by thunder, and popularly known as "heat-lightning," are merely the light from discharges of electricity from an ordinary thunder-cloud beneath the horizon of the observer, reflected from clouds, or perhaps from the air itself, as in the case of twilight. Mr. Brooks, one of the directors of the telegraph line between Pittsburgh and Philadelphia, informs us that, on one occasion, to satisfy himself on this point, he asked for information from a distant operator during the appearance of flashes of this kind in the distant horizon, and learned that they proceeded from a thunder-storm then raging two hundred and fifty miles eastward of his place of observation.—*Prof. Henry.*

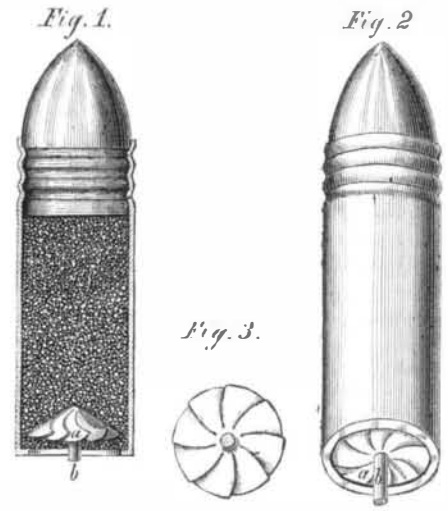
MAGNETIC PHENOMENA.

M. Ruhmkorff has the following notice in the *Comptes-Rendus*, vol. 1, p. 166:—"If a stay (bride) of soft iron be pressed against one of the poles of an artificial magnet, the soft iron is observed to become hard, and it is more difficult to file. If the stay be removed, it loses its hardness and resumes all the properties of soft iron."

THERE is a native California wheat, the kernels of which are about three times larger than the common kind. It shape is more like a rye kernel, being longer in proportion to its breadth than common wheat. It ripens very early, grows from five to six and a half feet high, and has heads averaging ten inches long.

MAYBERRY'S CARTRIDGE.

The usual mode of loading muskets in modern warfare is for the soldier to bite off the end of his cartridge, pour the powder into his gun, then insert the bullet and ram it home with the ram rod. Quite serious evils are found to result from the practice of biting off the cartridge; portions of the powder will scatter into the soldier's mouth in the excitement of action, the niter in which is sure to produce sores; while the repeated biting of dry paper added to the dust and fatigue of the battle excite an almost intolerable thirst. We recently called the attention of inventors to this subject, and we now illustrate one of the best inventions that has been called out by our suggestion. It consists of a very slight modification in the cartridge as ordinarily constructed.



This cartridge is made of paper with the base perfectly flat as represented in the engravings, of which Fig. 1 is a horizontal section of the cartridge and Fig. 2 a perspective view. Through the base a hole is cut of a size nearly as great as that of the base, and this hole is closed by a disk of peculiar construction, represented in Fig. 3, and at *a a*, in Figs 1 and 2. Two disks of moderately stiff paper, each cut with curved radiating divisions as shown in Fig. 3, are attached at the center to a light wooden pin, *b*. This disk is a little larger than the hole and after it is pressed into the cartridge it expands by its own elasticity and closes the opening. The cartridge may now be rammed to its place in the gun, and when the pin, *b*, strikes the bottom of the bore, it will force the disk inward and permit the powder to flow out so as to be fired by the cap.

Besides obviating the evils spoken of, this cartridge effects a notable saving of powder. In tearing open the ordinary cartridge a few grains of powder are frequently spilled upon the ground, but with this improvement all is poured into the gun. The saving of only a few grains to each cartridge, in all the millions that are used, is a matter of no small importance.

Application for a patent for this invention has been made through the Scientific American Patent Agency, and further information in relation to it may be obtained by addressing the inventor, J. C. Mayberry, at White Rock, Ill.

The Atlantic Telegraph.

[From the London Mechanics' Magazine.]

Several months ago we called attention to this most important enterprise as being in a condition, solely for want of the means of raising capital for its completion, which was anything but creditable to a country so familiar as ours with contention against physical difficulty; and we then indicated it was one of those peculiar works to which the moderate and well-guarded aid of government would be specially applicable. We are extremely glad to see that a movement is now being made in this direction. The government of the United States, stimulated no doubt by the forcible manner in which recent untoward events have brought before them the necessity for rapid communication with Europe, and by consciousness of the lapse that has been committed in remaining torpid so long, while the means of realizing that communication in the most perfect manner has lain at the very door, have addressed a special dispatch to their Minister here upon the subject. They express a warm desire to co-operate with the government of this country in such financial or other arrangements as shall secure the means of bringing once again, and this time permanently, we trust, into action that wondrous agency which in 1858 startled the whole civilized world by its successful though short-lived operation.

The American government do not stop even in their desire to coöperate with Her Majesty's government in the establishment of this good work. Notwithstanding that the most practicable route will give possession to Great Britain of the entire control of the cable at both ends, they desire to enter into engagements whereby the Atlantic Telegraph and its communications shall be guaranteed from all violence and wilful damage, even in the untoward event of a war between the two countries.

Conduct so unselfish and so courteous can surely meet with but one response from the British Cabinet. We feel that Parliament, with scarcely a dissentient, would agree to the small amount of risk that has been named as sufficient to resuscitate this enterprise in conjunction with America. We believe we are right in stating that it has been intimated that a guarantee, under careful regulations, of about 2 per cent from each government on a capital of £700,000 would suffice upon which to raise the entire amount. Even this small guarantee, we believe, would never be called upon for a shilling. The blunders and mismanagement that have characterized several of these deep sea cables which have proved failures have been so fully discussed in these columns that we need not further allude to them than to say that these evil days are now happily passed away, as we trust, for ever. That good and durable cables can be made, and laid, and worked in permanence, the Toulon-Algiers and Malta and Alexandria lines attest. Messrs. Glass, Elliot & Co. have just published a list of the lines made and laid by them, which shows that every cable which that firm has ever made and laid is at this moment in active operation, except two inconsiderable lines recently broken by anchors, which can be repaired with the greatest facility.

The long time that has elapsed since the original cable gave way, has been turned to good account by the Atlantic Company in the investigation of all the circumstances attending deep-sea cables; members of the company, among whom were the chairman and late Secretary, were chosen by the government as members of the commission appointed by the Board of Trade to examine and report upon the whole subject; and these circumstances, in combination with the vast improvements effected by the Gutta-percha Company in the preparation of their insulating substance; the invention of other substances of a similar character, said to be even superior to that material when sufficient time shall have elapsed to test their durability in the sea; and the continually-increasing experience of contractors in laying cables, lead to a well-grounded belief that the next attempt to span the Atlantic ought to be and will be a perfect success.

It would be idle to dwell upon the enormous results that would arise to the benefit of commerce, of government and of civilization generally, from the constant and regular flow of instantaneous communication between Europe and America. The connection of the Foreign, Colonial and War Offices, and of the Admiralty, with their respective correspondents on the other side of the Atlantic would, without any other consideration, perfectly justify our government in extending their warmest aid, consistent with prudence, to the carrying out of the Atlantic Telegraph Company's enterprise in the best manner, and at the earliest practicable period.

IN the ruins of Herculaneum the excavations are carried on actively. Toward the latter end of December last two lions were found in that town, half a metre long, and carved in marble. The style was Grecian, of a high order of art. Other interesting objects have been recovered, such as fragments of buried wooden furniture, chairs, boxes, coffers, constructed of bamboo or cane, grindstones, &c.

SHODDY is made of old carpets and blankets, and is frequently mixed with long wool and spun into filling. Noils is a name for the short wool which is combed from the long wool when the latter is employed for making worsted and kerseys.