THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

The usual weekly meeting of this association was held at the Institute rooms, on Thnrsday evening, 11th inst; Professor C. Mason presiding.

MISCELLANEOUS BUSINESS.

Social Progress. — On taking the chair, Professor Mason said: Our reception, this day, of the Prince of Wales—the symbol of British nationality—is in strange contrast with the dismission my grandfather helped to give his great-grandfather, when they broke down the statue of George III, at the Bowling Green, and reviewed his last troops on Evacuation day. It is quite in contrast with a more reeent state of things, which led my youthful company, in Rensselaer county, to offer themselves to Governor Tompkins, for the defense of the harbor, in 1815. But that year closed the long period of the war. The attempts to mend the world by fighting ceased from sheer exhaustion, and left the poor nations of the earth to the ameliorating experiments of applied science.

In 1819, Neilson invented the hot-blast furnace, which reduced the coal required to make a tun of iron from seven tuns to less than two, and brought into use the neglected black band ore. Two years later, the rolling mill appeared and produced a greater economy in the working of iron than the hot blast had made in its production.

But the great cost of conveying persons and property, except on navigable waters, was the stumbling block of social progress. This difficulty led the contrivers to explore the coal mines, where ingenuity had converted a steam pump into a nondescript machine for the carrying of coals on wooden trams, through long levels, to the mouth of the pit. World-building had operated at first from beneath, in throwing up hills. The underground contrivances sent np the locomotive to rebuild the world by a cheap and rapid conveyance of persons and property through the valleys which ran among the hills, or, if need be, under the hills, so that all lands might be inhabited, and all people enjoy all the products of the earth, by means of moderate, educated labor.

The whole work is done and has been done since I was the captain of a uniformed company; and the Prince of Wales has made the tour of North America in less time and with less discomfort than it would have cost George III. to explore the counties of Ireland.

"Look now at the social results. The men of science have had the field about as long as the fighting men had occupied it—say forty years. The results may be justly measured by the popnlation and its condition.

"Greatness may be attained by a nation of small numbers; Greece was an example. But greatness ranks far below welfare, and welfare is measured by happy numbers.

The men of science have mnltiplied the happy numbers of men, with a softened and diminished labor. They have more than doubled the entire population of Europe, and these large numbers are better taught, better fed, better clad, and better housed than the small population of 1815.

"In this conntry, since Evacuation Day, applied science has multiplied our whole population by eight. And if this welfare does not amount to greatness, it is sufficiently like it for all useful purposes.

"The wild beasts rejoiced in the acquisition of this island, and left it with reluctance. When the Indians arrived here, they rejoiced in the leisure and safety derived from its vast resources as a fishing ground, and they preferred death at the hands of the Dutch than life elsewhere. The Dutch gloried in resources of which the Indians never dreamed, and extended their outlying settlements beyond Spuytenduyvil. And when they yielded to the English, they secnred the right to remain. When the English yielded to the Yankees, and retired, we were surprised to find that our people acted and talked and legislated and worshipped and taught and traded like Englishmen in everything but royalty and lordship. And this day proves that we like an occasional glimpse of these.

At this moment I recall what my paternal grandfather, who was a stannch tory, used to say when I was a boy: "Remember that we were a race of Englishmen long before we were Yankees, and we shall be a race of Englishmen long after democracy has passed away."

The Re-organization.—The Committee on re-organization made their final report and were discharged with thanks for the faithful discharge of their laborious duties. A beginning of the new order of things was made by the members subscribing to the rules of the club.

Domestication of the Ostrich.— Lieutenant Bartlett gave a very interesting account of recent successful attempts, in France, of domesticating the ostrich. Late observations show that many of the popular notions regarding the ostrich are erroneous. It is commonly believed that the ostrich lays its eggs in the sand, and abandons them to be destroyed or to be hatched by the heat of the sun. The fact is, however, that the ostrich is peculiarly careful of its eggs, and is more faithful to them than the hen. The labor of sitting is divided between the male and female birds, each taking its turn. The male sits nineteen hours and the female five hours each day. The hens in good condition lay an egg every other day, and it is supposed that ostriches, if well taken care of, would be as prolific as ordinary fowl. Ostrich feathers always find a ready market, and it is said that the meat is delicious.

The President here called np the regnlar subject: "Cut-off Experiments."

DISCUSSION.

Professor Hedrick, assisted by Mr. Rowell, described an apparatns used in the series of experiments on the expansion of steam, at Waterman's factory in Cherry-street. The apparatus mainly consists of two chambers or vessels, each of 1 cubic foot capacity, and connected to each other by a 2 inch pipe provided with a cock of large port. By charging one of the vessels with steam at high pressure, and then exhausting it into the other, is was supposed that the practical deviation, if any, from Mariotte's law would be shown. One of the vessels is connected directly with the boiler, while the other is furnished with a blow-off cock. In order to keep the vessels at any desired temperature, they are entirely immersed, including the connection pipe, in an oil bath. The two vessels, when in the bath, are separated by a partition, so that the temperature of either may be varied independently of the other. Finally, the vessels are provided with pressure gages. The manner of making an experiment is as follows: tho oil bath is heated to the temperature of the steam of the boiler; the blow-off cock being opened, steam is passed through the vessels till the air has been replaced by steam. The cock of the connecting pipe is then closed, and the pressure of steam in the second vessel falls to the atmospheric pressure, when the blow-off cock is closed. The connection with the boiler is now cut off from the first vessel, and the cock of the connecting pipe is opened. The steam of the first vessel now expands into the second, the pressure is equalized, and the gages show what variation, if any, there is from theoretical calculations. Mr. Rowell remarked that the conclusion from the many experiments made was that the actual expansion of steam varies about 10 per cent from the law of Mariotte. If theory is correct, 60 lbs. pressure in the first vessel should become 30 lbs. on expansion. But it becomes less than 28.

Mr. Koch—The fignres by theory, are 28.6. I have made a careful examination of this subject, and am prepared to demonstrate that 60-lb. steam on doubling its volume has a pressure of precisely 28.6.

Mr. Garvey—This apparatus is open to many objections. It cannot be relied on. The temperature cannot be uniformly maintained. Even the gages will convey away heat enough to vitiate a conclusion. The construction is grossly inaccurate.

Mr. Rowell—The gentleman's language is too severe. I shonld not object to his telling ns, if he thinks so, that the apparatus might lead us to entertain erroneous conclusions, bnt "*grossly* inaccnrate" is offensive.

Mr. Garvey—I do not mean any less than I say.

Mr. Dibben—I was present at some of the experiments with the apparatus and was afforded every facility of examination. The results given by it are not anomalies when reasonably considered, and do not in the least weaken my confidence in the utility of the steam expansively. At the time the experiments were made, I took notes of what was done, but inadvertently I have not brought them with me. I will, however, give the figures approximately from memory, and be able to show how this apparatus operated in practice.

1*st. Experiment.*—Boiler pressure, 45 lbs.; 1st vessel, 300°; 2d vessel, 175°; pressure after expansion, 5 lbs. Here it is evident that the steam was almost instantly condensed in the 2d vessel.

2d. Boiler pressure, 45 lbs.; 1st vessel, 300°; 2d vessel, 300°; final pressure, 6½ lbs.

3d. Boiler pressure, 45 lbs.; 1st vessel, 300°; 2d vessel, 210°; final pressure, 7 lbs.

4th. Boiler pressure, 45 lbs.; 1st vessel, 330°; 2d vessel, 300°; final pressure, 22 lbs. In this experiment the steam was superheated before expansion. The vessels were now taken out of the oil baths, and the experiments were continued, no particular care being taken to regulate their temperature—

Experiment.	Boiler pressure.	Pressure after expansion
1.....	80 lbs.	31 lbs.
2.....	80 "	35 "
3.....	75 "	32 "
4..... ..	22 "	nearly 11 "

The experiments in the air are nearer the ordinary conditions of practically-working steam, and clearly show the gain by expansion. Mr. Dibben continued with comments on the experiments and pointed out how the conducting power of the oil accounted for the apparent anomalies of the first set.

Mr. Seely—Mariotte's law, until recently, has been accepted as mathematically true. It has been shown, however, that no gas whatever conforms to it, some varying one way, some the other. The condensible gases and steam vary much more than the permanent gases, and with these the variation is always greater near the point of condensation to the fluid state. These facts have been demonstrated by the ablest experimentors of modern times, and the particulars as to steam and the most common gases may be found in almost any of our large treatises on chemistry. The variations from Mariotte's law are however so small that in ordinary discussion of steam and air we very properly neglect them; they would only complicate the subject unnecessarily. Now, if this apparatus is designed to show the fallacy of the Mariotte theory, it is clumsy and unreliable.

Professor Hedrick—The apparatus is designed to illustrate the practical working of steam, and for that purpose it is admirable.

Mr. Seely—I agree with Professor Hedrick as to the utility of Mr. Isherwood's experiments. I object to the apparatus only when it is proposed to determine by it a philosophical principle.

Professor Hedrick—I understand that these experiments are carried on only in view of useful results. No one denies that steam under pressure will expand with power. The practical question is how much of this power can be realized, and the experiments will probably show that the advantage of expansion is commonly overstated.

Mr. Rowell—Mr. Stevens, of Hoboken, says he has used all kinds of engines and applied many tests, and the result of all his observations is that there is no advantage in cutting off at less than one half.

It was ultimately agreed to defer the conclusion of the discussion for a future meeting, when the final report of the committee should be ready.

Subject for next week: "Recent Practical Applications of Magnetism.

HOW NEW YORK SELLS DRY GOODS.

The New York correspondent of the Boston *Post* furnishes the following statements in regard to the leading traders of this city:—

Claflin, Mellen & Co. are the heaviest dealers in merchandise in New York—their yearly business exceeding that of Stewart by some three million dollars. Their aggregate sales swell up to the enormous figures of eleven millions annually. The per centage of net profits on this amount is, however, quite small; bnt even at eight per cent, the sum of eight hundred and eighty thousand dollars must find its way into the private bank accounts of the several partners. Next, in amount of sales, comes the establishment of A. T. Stewart & Co. They sell eight millions a year, of which two and a half millions are disposed of at retail, and the remainder at wholesale; $300,000 worth of gloves alone are handled by this house. No paltry per centage is assessed upon the buyers at the Broadway marble palace. The class of goods sold is such as always bears a high price and a large profit. I happen to know of one instance where a

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twentieth share netted one of the partners $60,000 in a single year, which proves the profits of that year to have been $1,200,000. One million dollars a year will be about the margin of excess over all expenditure. Next in the same line come the houses of Lord & Taylor, and Arnold, Constable & Co., the former of which does a business, in several stores, of $6,000,000 annually, at a profit of some $800,000; while the latter firm enjoys a regular unchanging trade of about four and a half or five millions, which pays a yearly profit of not far from six hundred thousand dollars. Of houses in the dry goods trade, whose yearly trade ranges from five to seven millions, there are several, as for instance, C. W. & J. T. Moore & Co., Phelps, Bliss & Co., and S. B. Crittenden & Co. Their profits foot up variously from two to four hundred thousand dollars. J. R. Jaffray & Sons, our leading lace house, sell enough of that strictly female fabric to net them six hundred thousand dollars a year profit. Some of the Boston branches located here, exceed in their sales five millions yearly. Such are A. & A. Lawrence & Co., J. W. Paige & Co., and A. F. Skinner & Co. The first-named firm, as every one knows, place some ten million dollars worth of domestic fabrics per year. The profits of all these commission houses are only from one to two per cent upon the sales. Garner & Co., a commission firm, sell between eight and nine millions per year at paying rates; while of those doing a dry goods commission business of from three to five millions may be named Hoyt, Spragues & Co., Low, Harriman & Co., and Hnnt, Tillinghast & Co. Their profits overleap a hundred thousand dollars a year. There are several French and English importing houses whose sales overrun into the millions, and whose profits are a fortune every year.

THE WAY JOULE'S EQUIVALENT WAS ASCERTAINED.

First, By observing the calorific effects of magneto-electricity. He caused to revolve a small compound electro-magnet immersed in a glass vessel containing water between the poles of a powerful magnet; heat was proved to be excited by the machine by the change of temperature in the water surrounding it, and its mechanical effect was measured by the motion of such weights as by their descent were sufficient to keep the machine in motion at any assigned velocity. Second, By observing the changes of temperature produced by the rarefaction and condensation of air. In this case, the mechanical force producing compression being known, the heat excited was measured by observing the changes of temperature of the water in which the condensing apparatus was immersed. Third, By observing the heat evolved by the friction of fluids. A brass paddle-wheel, in a copper can containing the fluid, was made to revolve by descending weights. Sperm oil and water yielded the same results. Mr. Joule considered the third method the most likely to afford accurate results; and he arrived at the conclusion that one unit of heat was capable of raising 772 pounds 1 foot in hight; or that the mechanical equivalent of heat was expressible by 772 foot-pounds for one unit of heat—known as "Joule's equivalent."

The following are the values of Joule's equivalent for different thermometric scales, and in English and French units:—

1 English thermal unit, or 1° Fah. in 1 lb. of water,	772 foot-lbs.
1 centigrade degree in 1 lb. of water	1389·6 "
1 French thermal unit, or 1 centigrade degree in a kilogramme of water	423·55 kil'trs.

ROOM PLANTS.

During the cold days of winter, when fields and gardens are stript of their foliage and coloring, it is pleasant to witness the care and the taste which some ladies bestow in the culture of flowers in their houses. The last number of the *Horticulturist* contains an interesting article on this topic, from which we select a few extracts for our lady readers:—

We should be glad to do or say something to increase the number of those who grow room plants. It is true that plants cannot be as well grown in rooms as in a well-constructed greenhouse; but, notwithstanding, there are some kinds that may be grown and flowered in a manner quite satisfactory, and with results highly gratifying. Certain conditions are necessary for the best success, and these it is our object to point out. The greatest obstacle to success is the dryness of the air: this may in a measure be overcome by a table suitably constructed, and the selection of plants best adapted to a dry atmosphere. The table should be the length of the window, and two or three feet wide, the boards being tongued and grooved. Around the edge nail a strip three inches wide, making the corners fit tight. The table is then to be filled with two inches of clean white sand. With a table of this kind, the foliage of the plants can be frequently syringed or sprinkled with water, which keeps them clean and promotes their health; the drippings and surplus water are caught and absorbed by the sand, and the floor of the room is thus kept clean; the sand, indeed, ought to be kept constantly wet, and even watered for this purpose, if necessary. The evaporation from the sand will diffuse itself among the plants and through the room, and thus overcome, in a small degree, one of the chief obstacles to the successful culture of plants in rooms. The table should be fitted with rollers, to facilitate the operation of watering and cleaning the plants, and also for the purpose of moving it back from the window during very cold nights. The flower-stands in common use are altogether unfit for a room; the surplus water, dead leaves, &c., fall to the floor, injuring the carpet, and giving the room an untidy appearance. The table above described is free from these objections, besides having positive advantages for the successful growth of plants which no ordinary flower-stand can possess.

All rooms do not possess equal advantages for growing plants. A room with large, high windows, looking to the south, is the best; the next best is one with a southeast or southwest exposure; next, east; next, west; and the least desirable of all, one looking to any point north. A large bay window with a southern exposure possesses many advantages for growing plants, quite equal in many cases, and superior in some, to these structures absurdly called "plant cabinets," unless the latter be intended for the preservation of dried specimens, the only purpose for which most of them are fit. A basement window with a southern exposure will sometimes answer tolerably well, but a room in the upper part of the house is always to be preferred.

Plants cannot be well grown anywhere, or under any circumstances, when crowded together; it is always more satisfactory to grow a few well than to grow many indifferently. During very cold nights the table may be moved to the middle of the room; and if the plants should unfortunately get frozen, darken the room and throw cold water over them repeatedly till the frost is drawn out, and then expose them gradually to the light. In this way we have saved plants when the ball of earth has been frozen as hard as a brick. Room plants should not be brought into the house till the nights get frosty, and while out of doors they should have a sunny exposure. Insects should be looked after, and destroyed on their first appearance; a little attention in this way will keep them free from such pests.

ORNAMENTING ROOM WINDOWS.—The following very simple method of decorating windows, when it is desirable to shut off a portion of light, and subdue its character, is described in the London *Photographic News*:—The glass must be thoroughly cleaned and freed from every sign of grease. Then mix on a slab of ground-glass, palette, or what not, a little of the tube oil color, sold for the purposes of the artist, diluted slightly with a little pale drying oil. Lay this thinly over the glass with a large, soft brush, and then taking a large hog-hair tool, the hairs of which are of a perfectly uniform length, hold it perpendicularly to the glass, and commence dabing the ends of the hairs, gently, and with an equal amount of pressure over the whole surface, until a uniform degree of opacity is secured, and the glass has all the appearance of being ground. Now, if you desire to give this a very decorative character, closely resembling that of what is termed embossed glass, you may do so with much ease. Draw out, first, on a piece of paper the required size, some pattern of an elegant character, a design for which may easily be discovered in any work on ornamental art, making the lines sufficiently strong to be seen through the semi-opaque glass; and then, with wooden points of various degrees of thickness, some finely pointed, and others wider and flat (like the edgeof a chisel) trace ont on the painted surface of the glass the drawing laid under it. The points will remove the wet paint. A piece of wash-leather is sometimes fastened to the ends of the sticks for the better clearing off of the paint, but in this case you must carefully prevent the leather becoming charged with paint, by repeatedly cleansing or changing it. This pattern being clearly defined and perfectly transparent, the glass is then put aside to dry, and fixed in its place the painted side inwards. To clean it use simply a little pure warm water *without soap*.

It is stated, in a late foreign paper, that bathing has been found to be a certain cure for plenro-pneumonia; that a gentleman in Ireland, who tried the experiment on eight cattle who were infected, saved seven of them by driving them into a bath.

A COLUMN OF VARIETIES.

The Spaniards of South America use twisted raw hide for ropes and as substitutes for log chains in working their cattle. Raw hide is very strong and lasts quite a number of years, even when considerably exposed.

Shingled roofs, whitewashed with lime, last nearly twice as long as roofs which receive no treatment to render them durable.

The total amount of wheat received at Chicago, since the 1st of January last, is 26,860,973 bushels, against 12,428,478 bushels received in the corresponding period last year.

The Pacific Mill at Lawrence, Mass., is the largest factory, in a single building, in the world. It is 800 feet long and 80 wide, and contains 108,000 spindles, with all the attendant machinery to manufacture delaine and muslin goods, from the raw material up to the finishing touch ready for market.

The Magnetic Telegraph Company in England, which has lines extending through the whole United Kingdom, issues stamps for franking messages. This is similar to the postage stamp system, and is found very convenient to merchants and others.

The last number of the *North British Review* contains an article on meteorology, in which severe winters are stated to be connected with the appearance of spots on the sun. If the writer's theory be correct, the next winter should be a very cold one.

It is stated by Mr. Nicholas Longworth, of Cincinnati, the great vine cultivator, that wine made from the best native American grapes surpasses in quality the best wines of Europe.

The tobacco crop inspected at Richmond, Va., for the year ending October 1, 1860, amounted to 46,633 hhds., which is an increase of 4,635 hhds. over last year's crop.

On the 16th of August last, a flash of lightning struck a windmill at Lappion, in France, in which there was a female who was killed by the electric fluid, and on whose body there was left the picture of a neighboring tree, with all its branches and leaves complete. This singular tatooing by the lightning was seen and attested by medical examiners and the municipal authorities of the place.

The Philadelphia *Engineer* advocates the employment of single cylinder locomotives, as their adoption would mark a revolution in locomotive construction, and result in great economy. A number of locomotives with single cylinders are stated to have been made by Neilson & Co., of Glasgow.

Mr. Holley, in a communication to the *New York Times*, states that "the cost of hauling a passenger or a ton of goods a mile on an English railroad is about one-half only of what it is in America." The reason of this is that English roads are better constructed and require less power to do the work.

Two years ago, a Canadian, near Acton, C. E., while engaged in digging potatoes, found some fragments of copper ore. On the 15th of September, 1859, Mr. Lewis Sleeper, a school teacher at Montreal, having obtained a lease of the grounds, commenced the development of a mine with great success, having, since March last, taken out $280,000 worth of ore, some of the blocks weighing 15 tuns. A few days ago this mine was sold for $500,000, of which Mr. Sleeper received $200,000.

From the census of Australia, taken on the 1st of April last, it appears that the total population was 117,727. Of this total of 117,727, no less than 43,349 were born in the colony, 49,788 in England and Wales, 7,172 in Scotland, 12,128 in Ireland, 2,201 in other British possessions, 7,864 in Germany, 1,093 in foreign countries, leaving 122 not specified.

The numerous cases of poisoning resulting from the employment of the pigment known as Brunswick green, or arsenite of copper, has induced the French sanitary board to take measures to suppress its use in various arts, as those of the dyer, calico printer, paper stainer, &c. Many articles of ladies' clothing dyed with this pigment, artificial flowers, &c., have caused dangerous illness to their wearers. In light materials, as gauze, tarlatan, &c., this pigment is shaken out in considerable quantities during dancing, or rapid motion accompanied by friction, and finds its way into the fuces and nostrils of the wearers, producing the most alarming symptoms.

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