

### 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 Thursday 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 dismissal 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 recent 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 ton of iron from seven tons 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 up the locomotive to rebuild the world by a cheap and rapid conveyance of persons and property through the valleys which run 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 population 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 multiplied 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 country, 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 Spuytenuyvil. And when they yielded to the English, they secured 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 staunch 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 up the regular subject: "Cut-off Experiments."

#### DISCUSSION.

Professor Hedrick, assisted by Mr. Rowell, described an apparatus 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, it 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: the 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 figures 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 should not object to his telling us, if he thinks so, that the apparatus might lead us to entertain erroneous conclusions, but "grossly inaccurate" 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.

1st. 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 condensable 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:—

Claffin, 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; but 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