

The Royal Aquarium at Westminster.

The large building which has been slowly rising at Westminster, on the ground facing the Abbey and the Houses of Parliament, and which is to present under one roof the varied attractions of an aquarium, a summer and winter garden, with a museum and picture gallery, in addition to the more commonplace but useful features of a reading room, library, and restaurant, was formally opened on January 22 by the Duke of Edinburgh, in the presence of a large gathering of ladies and of the members of the society under whose auspices the scheme has been so far brought to a successful issue. The building, which has been erected by Messrs. Lucas, from the plans of the architect, Mr. A. Bedborough, stands on a site of three acres, stretching from the chief entrance, near the Westminster Hospital, as far as the St. James' Park station on the Metropolitan Railway, the freehold of the land having been secured by the society. It will give some idea of the extent of the center or main transept, which is to be used for promenade and concert purposes, and in which the opening ceremonial took place, if we state that it is 8 feet greater than the principal transept of the Crystal Palace, reaching to 160 feet. The height from the floor to the level of the roof is upwards of 70 feet, and round the building are the galleries, which are used for the fine art exhibition and as a museum. So far the architect has proceeded on well-worn lines, and has produced a handsome and spacious hall, suited alike for promenade or for musical performances. This, however, although the chief part of the structure, is not to be its main attraction; for it is in the aquarium proper that the great *raison d'être* of the undertaking, according to the views of its promoters, will be found. The tanks for the reception of the fish are of enormous extent, but at present, although complete, they are untenanted. The system on which they are to be supplied will insure a constant circulation of water; and as it will thus be kept in freshness and comparative purity, it is anticipated that the results will be even more satisfactory than in those aquaria already opened in this country and on the continent, where the water is never changed. This method of keeping the water in circulation has been invented by Mr. W. A. Lloyd, the naturalist. There are thirty-one show tanks, nine for fresh water fish and twenty-two for sea water fishes and animals, in addition to the marine tanks which are to contain the food supply of the permanent inhabitants, and to serve for the segregation of the sick—forming, in fact, a sort of hospital. The water for the tanks, consisting of about 600,000 gallons of sea water and 200,000 of fresh, is to be supplied from reservoirs below the center transept, to which it is returned after flowing through the tanks. Another feature of the undertaking—and probably one of the most attractive parts of the programme—will be the daily concerts by an orchestra of forty-eight performers, selected by Mr. Arthur Sullivan, and conducted by Mr. George Mount. Classical concerts, personally directed by Mr. Sullivan, are to be given at intervals. Following the system recently introduced at the Crystal Palace and the Alexandra Palace, a theater forms part of the scheme, and in this building dramatic performances will be given.

English Products in the United States.

We called attention, recently, to the collapse of the English steel rail trade, which in this country at the present time is totally dead, no rails having been imported hither from Sheffield for over nine months. From a statement of exports from the United Kingdom to the United States, lately issued by the Chief of the Bureau of Statistics at Washington, the following figures are given, indicating the exports in January, 1875, and in the same month of the present year:

	1875.	1876.1
Hardware and cutlery.....	\$56,296	\$34,765
Pig iron and steel, tons.....	2,637	1,948
Bar, angle, bolt, and rod iron, tons.....	242	240
Railroad iron, all sorts, tons.....	2,376	23
Hoops, sheets, boiler and armor plates, tons.....	269	100
Steel, unwrought, tons.....	793	640

The immense fall in railroad iron shows that the decline is not confined, in that class of exports, to steel rails alone, while the very small amount of other metal goods brought over indicates that the trade has shrunk greatly.

Nor is this decline visible in metal industries alone. The comparative returns for the two months show a falling off of over a million yards of cotton goods; in haberdashery, a reduction of over fifty per cent; over a thousand tons out of eight thousand in tin plates; a million yards of linen (ten million odd to nine million odd). In silk goods there is a falling off of fifty per cent; the same in carpets, in writing and printing paper, in beer and ale, and in spirits. About the only exports on the list which hold firm are china ware, wall paper, articles of silk mixed with other materials, stationery other than paper, and worsted cloths. The value of the English machinery imported hither, on the other hand, has nearly doubled, from \$73,475 to \$126,370; but neither of these sums is large, and probably the increase is due to apparatus brought here in anticipation of the Centennial.

Etching Process.

In Ackermann's *Gewerbezeitung*, Herr Fichtner gives an account of a way of producing etchings in relief by asphalt. Select pieces of asphalt which do not melt at 90°, and are difficult to dissolve in turpentine; dissolve five parts in a mixture of ninety parts of benzole and ten parts of oil of lavender; the benzole must be separated by distillation from any impurities that would render it too sensitive to light(?), after which it must be thoroughly drained before being used.

The oil must be perfectly free from water. Coat a perfectly clean and smooth zinc plate with the varnish, allowing the latter to run off like collodion; then dry in a horizontal position in the dark. Expose the plate under a negative from twenty-five to thirty minutes in the sun, or three or four hours in daylight, according to the sensitiveness of the asphalt film, which must be ascertained by experiment. The exposed plate is then developed with rock oil, to which a sixth of its volume of benzole has been added; the oil is poured over the plate and moved about until the whites are perfectly clean; the plate is then washed under a jet of water, dried in the light, and etched with diluted nitric acid. There must be a careful avoidance of air bubbles.

Improvement in Electric Illumination.

It is well known that the electric light is due simply to the electric current heating the medium it passes through; and the more resistance is offered to the current, the greater is the heat developed. The great intensity of the ordinary electric carbon lamp is owing to the badly conducting layer of atmosphere between the carbon points, and the layer being very much heated makes the carbon burn with a white glow. By reason of the great resistance of this layer of atmosphere, which only a powerful current can overcome, the light must necessarily be a very brilliant one.

It is possible, without the aid of air or gas, to make a solid body quite hot, as, for instance, in the case of a platinum wire; the illumination thus produced is, however, weaker and more uniform, and may be intensified or diminished. But it cannot be applied practically by reason of its great expense, and because, if the heat becomes too intense, the wire is apt to fuse. For this reason, the idea struck Ladiguin to replace the platinum wire with thin bars of graphite or carbon. This graphite possesses, at an equal temperature, much greater radiating properties than platinum. The heat capacity of the latter is twice that of the carbon, so that the same temperature will heat a thin bar of graphite to double the degree which would be attained by a platinum wire of the same dimensions under similar circumstances. Moreover, the electric resistance of the carbon in question is about two hundred and fifty times that of platinum, and the carbon rod may be fifteen times as thick as a platinum wire of the same length, supposing the current is to give the same amount of heat. Finally, there is no disposition for the carbon to melt, even at the highest temperature.

For these reasons the Ladiguin method of electric illumination may be regarded as a most valuable one, as, indeed, it has already proved to be. The only drawback to it seems to be that the carbon gradually combines with the oxygen of the atmosphere and burns away; but this defect the inventor has overcome by confining the carbon in an airtight glass, from which the oxygen has been removed in the simplest manner, and replaced by nitrogen.—*Polytechnisches Notizblatt.*

Remarkable Coal Mine Explosion.

The anthracite coal region in the vicinity of Wilkesbarre, Pa., was the scene of a very remarkable gas explosion on March 6, 1876. The following particulars are from the *New York Herald*:

The explosion occurred in the mine known as the Prospect shaft, and owned by the Lehigh Valley Coal Company. The mine has been in operation about five years, and has always had the reputation of making more gas than any other mine in the anthracite coal region. In consequence the utmost precautions have always been taken against an explosion while the mine was in operation, by applying the best means of ventilation known. On the night of the 19th of January last, the mine took fire from the ignition of a current of gas, just after a blast had been made by a miner, and it was found necessary to force water into the mine for three weeks, until it was estimated that nearly ten millions of gallons of water had been poured in.

Operations were lately commenced to take out the water, and this was done by means of buckets holding 1,100 gallons each, which were fixed in the shaft and raised and lowered alternately. It was calculated that about 60,000 gallons were raised in this way every twenty-four hours. The shaft has a depth from the surface of 600 feet. When the work of bailing the mine was commenced, there were about 100 feet of water in the shaft, showing that the chambers and gangways below, which traverse a space of about a half mile square, were all filled. As the water was lowered, the gas, which had been forming constantly since the fire, began to push its way through the water. It is calculated that the water was charged with millions of cubic feet of gas, more or less; the gas escaped up the shaft. The work of bailing continued until about nine o'clock on the evening of the 6th of March, when suddenly a low, rumbling sound was heard below ground; and in a moment after, an explosion like a hundred earthquakes broke on the air, and sent its terrible echoes along the valley for miles in every direction. The shaft is located on a high hill, and instantly a stream of fire, forty feet long and twelve wide, shot up into the air for a distance of 500 feet. The whole country around for miles was brightly illuminated by this vast column of burning gas. The houses in the vicinity of the shaft shook like reeds at the moment of the explosion, and thousands of people turned out in terror to see what had caused the unusual commotion.

At Wilkesbarre, a little distance in the valley below, the loud report was heard, and the great flame of light, shooting heavenward above the shaft in the mountain, caused the greatest excitement, which grew momentarily as the illumination continued. Those at a distance could only conjecture what the cause of the Vesuvius counterpart was. Many

people really believed that a volcano had broken loose, and terror seized upon more than one nervous witness. The tremendous stream of fire shot up from the shaft for three hours, loud explosions occurring every fifteen minutes. In the meantime thousands of excited people from all sections flocked to the vicinity of the shaft, and stood mute witnesses of the greatest sight which any eye had ever looked upon. It is supposed that as the water was taken out of the mine, the pressure below became lighter, and the gas, which had been pushed back by the weight of the water before, now mingled with the flood, and to such an extent that the water itself was capable of being ignited at the touch of a match; this must have been the case, for one of the men, who stood near the mouth of the shaft with lighted lamp when a bucket of water came up, was splashed by the overflow, and a drop falling in the flames of his lamp instantly caught fire, and in a moment the frame heading which stands over the shaft took fire; and as the sparks dropped into the deep pit below, they ignited the gas there generated, and of course an explosion followed.

Successful Progress of the Mississippi River Jetty Works.

An Associated Press telegram of March 5 states that the three-masted schooner *Mattie W. Atwood*, 783 tons, with cargo of 2,250 bales cotton, and drawing 13½ feet, was put to sea through the jetty channel at South Pass on that morning. This is the first merchant vessel that has passed through the jetty channel, where, seven weeks ago, there was barely 7½ feet of water; now there is 14 feet.

"Constant soundings and surveys are being made," says the *New Orleans Times*, "and we know from these that, in many places right on the bar, where there was formerly six or seven or eight feet of water, there is now eighteen and twenty and twenty-three feet. This will soon be practically demonstrated by the passage of the deepest laden vessels. 'Tis only a question of a few days or weeks, not months. The great engineer, Eads, and the indefatigable builder, Andrews, are to be congratulated on the success of this most important national work, and New Orleans cannot do too much honor to these men for what they have done toward consummating her future prosperity and commercial pre-eminence."

Giffard's Cold Air Engine.

The principle of the cold air generators is well known. When air is subjected to compression, heat is developed. When deprived of the heat, and subsequently allowed to expand, it re-absorbs heat so eagerly as to produce a notable lowering of the temperature, which is susceptible of application to a variety of practical purposes. A new description of airtight cylinder, new joints, and a new stuffing box have enabled M. Giffard to so far improve upon previous machines that his cold engine, when driven by an ordinary steam engine, will make 20 lbs. of ice for each lb. of fuel burned.

New Property of Glycerin.

R. Godeffroy, on examining a chemically pure glycerin from the Apollo Japan Works in Vienna, found that when heated to 150° it took fire, and burned with a steady, blue, non-luminous flame, without diffusing any odor or leaving a residue. The glycerin had the specific gravity of 1.2609. This property enables glycerin of lower specific gravity to be burned by means of a lamp wick.

DECISIONS OF THE COURTS.**United States Circuit Court—Northern District of New York.**

STOVE PATENT.—*ESK BUSSEY AND CHARLES A. MCLEOD vs. JAMES WAGER; ESSEK BUSSEY AND CHARLES A. MCLEOD vs. HICKS AND WOLFE.*
(In equity.—Before WALLACE, J.)

A new combination, producing new and useful results, and not merely an aggregation of the results, due to the independent action of the several parts, is a patentable invention.

Bussey combined a reservoir in such relation to a top plate and partial back plate that the reservoir performed both the functions of a reservoir and of a partial back plate of a stove—a new result.

Liberal construction should be accorded patents, so as, if possible, to secure to an inventor what is really his invention.

The description and drawings of an original patent may be looked to, to disclose the real invention of a patentee, when the original claims are defective or the resale claims obscure.

This was a bill in equity filed against the defendants for infringement of reissued letters patent, No. 5,435, dated June 3, 1873, granted to complainants for improvements in reservoir cooking stoves.
[*Esek Cowen and George Harding* for complainants.
Samuel A. Duncan and George Giffard for defendants.]

Recent American and Foreign Patents.**NEW MECHANICAL AND ENGINEERING INVENTIONS.****IMPROVED CAR COUPLING.**

Daniel B. Palmer and David S. Kepler, Chambersburg, Pa.—The object of this invention is to provide an improved automatic coupling for cars. The principal features of the invention consist in a pair of hook-shaped, vertically moving jaws, held together by springs and operated by levers, in combination with a long pivoted link permanently attached to one of the jaws, each set of jaws carrying one of said links. The invention also consists in the arrangement of the drawbar, and in a set of automatically releasing levers which, when the jaws are opened by the hand lever, take the link and lift it into such a position as to allow the link to be withdrawn when the cars are to be separated.

IMPROVED APPARATUS FOR TRANSMITTING POWER.

Joseph L. Crabtree, Flintstone, Md.—This is mainly an arrangement of parts to form a wheel, in combination with a cylindrical end flange, carrying interior cogs, which gears with a pinion upon an eccentric shaft, to transmit to greater advantage the power received. The device is adapted to over and under shot water wheels.

IMPROVED PIPE COUPLING.

Isaac Johnson, Chicago, Ill.—This invention relates to a novel mode of connecting the sections of a pipe made of lead and sheet metal, and consists in the employment of a hollow connecting piece annularly grooved near each end, the metal of each pipe section being quickly pressed into the groove. When the tool is pressed and turned around the pipe, the metal is drawn forward and the pipe shortened by filling the grooves, without pulling apart the ends.