IMPROVEMENT IN MAKING OIL OF VITRIOL.

The *Druggists' Circular* gives the following account of the large chemical works of Messrs. Tennant in Glasgow, Scotland, and of some improvement lately introduced in making sulphurated acid:—

"The magnitude of the works of this firm is exemplified not only by their size, and the great Tennant's stack (a tall chimneyover 400 feet in height), but principally by the astonishing aptness and readiness with which the improvements of modern chemistry and mechanical arts are taken hold of.

"The whole establishment and its appliances compare only with the size of that monster chimney.

"A horse-railroad connects the different yards and buildings, and over the roofs another system of rails is laid, for the sole purpose of distributing the fuel in the various factories, by merely dumping the car containing it. A tunnel of not inconsiderable length, connects two of the main-works.

"The never-separable trio, oil of vitriol, soda, and chloride of lime, are sent from here in incredible quantities to all parts of the world. The quantity of oil of vitriol manufactured weekly reaches 600 tuns, that of soda-ash 250, of sal soda 180, requiring about 450 tuns of salt per week.

"Regarding their mode of manufacturing oil of vitriol, some very remarkable improvements have been introduced. Instead of the nitric acid or saltpeter formerly used, they employ nitrous acid, dissolved in oil of vitriol. The latter possesses the quality when of a specific gravity above 1.75, to absorb nitrous acid, and to give it off on dilution with water. On top of the first lead chamber, of each system of six, are placed two large leaden vats, of which one contains the solution of nitrous acid, the other water. From each a siphon reaches into the chamber where they connect, thus setting free the nitrous acid. This by giving off one atom of oxygen oxydizes, the sulphurous acid which is present in gas-form, is again oxydized by the atmospheric air passing through the chamber, and would never require to be renewed, if some portion were not constantly carried off by the draught. It has however been found from the quantity of nitrate of soda, that this process of loss and gain of oxygen repeats itself with nitrous acid about 132 times before the original quantity is entirely lost. The gases, as they are escaping from the lead chambers, are made to pass through a tower filled with coke in small lumps, over which sulphuric acid is running in a thin stream from above. In this manner about one half of the nitrous acid is regained. The nitrous acid is obtained at Tennant's by a peculiar method. A mixture of 3 equivalents or about that proportion of sulphuric acid, one of nitrate of soda, and two of chloride of sodium form by distillation three equivalents of sulphate of soda, one o. nitrous acid and two of chlorine. That is, instead of obtaining and using nitric acid, as others do, for the oxydation of the sulphurous gas, Tennant takes advantage of the two atoms of oxygen, which are of no use in the lead-chamber, in such a way as to obtain two equivalents of chlorine gas in their place.

"The apparatus for this double decomposition consists of cast-iron cylinders, from six to seven feet long, and from seven to eight in diameter, placed horizontal in furnaces. They are charged at the front with the salts and by a funnel at the top with oil of vitriol, The gases evolved are passed a through system of lead vessels filled with sulphuric acid, which absorbs the nitrous acid while the purified chlorine passes on to the chloride of lime-chambers.

"This chlorine, of course, furnishes but a portion of the quantities manufactured at the works. The greater portion is evolved in square stone vats from black oxyd of manganese and muriatic acid, heated by steam on the outside. One of the greatest improvements made in this manufactory is the regeneration of the binoxyd of manganese from the crude solution of chloride obtained in these stone vats. The liquor is run off into cisterns where it allowed to settle. It consists principally of an acid solution of chloride of manganese, of some per-chloride of iron and alkaline earths. These latter oxyds are precipitated by chalk or lime, which are added in just sufficient quantity. The thus-neutralized and purified chloride of manganese is then pumped by a wheel into large pans where it is mixed with whiting, and the milk thus produced transferred to a collosal cast-iron pan, nine feet wide and 80 long. Through the whole length of this pan a hollow stirring shaft works by means of a power at each end. When the machinery is set working high pressure steam enters the mixture through apartures in the shaft, and by the action of this and the chalk combined, all chloride of manganese is converted into carbonate of the protoxyd. The mixture of chloride of calcium and carbonate of manganese is thoroughly washed and stirred in similar pans of sheet-iron, 100 feet long, and eight feet wide, by the same stirring-apparatus. When pure the carbonate of manganese is thrown on heaps, to rid it of most of the moisture, and when sufficiently dry it is placed into flat iron-dishes, and these again into a furnace where they run up and down on an endless chain at a temperature never exceeding 300°Fah.

The water and carbonic acid being driven off, the protoxyd gradually oxydizes in the slow heat of the furnace, which for that purpose admits some air. If a higher temperature be applied the product would again lose oxygen and form sesquioxyd. The dark brown oxyd obtained by the above process is almost pure, and contains from 73 to 90 per cent of pure binoxyd.

PHOSPHORESCENCE.

At a late meeting of the American Photographic Society, in this city, a paper was read by S. O. Tillman, A. M. (since published in the *Journal of Photography*), on photo-phosphorescence, which elicited considerable discussion, and regarding which the president (Professor Draper) made the following remarks:—

"I have made many experiments on phosphorescence; it is a subject which has engaged my attention for many years. I only mention a fact or two which may be found to have some hearing on the question of stored-up light. If the powder of sulphide of calcium be spread on some convenient surface, as a sheet of tin, and upon this a key be laid and the whole be exposed for a few minutes to the sunlight, on bringing it in a dark room and removing the key, the whole surface will shine, except where the key left its shadow. The image of the key will appear black on a white ground. The phosphorescent light, however, gradually diminishes till the image of the key cannot be distinguished. If now a ring be laid on the powder, and the surface be again exposed to sunlight, in the dark the image of the ring will appear and disappear. The experiment may be continued with other objects, and with precisely similar results. So far you find nothing that you did not know or might easily anticipate. But now heat the plate in the dark, and the images of the key and ring, and other objects, will reappear. These images were impressed, for a considerable time were latent, and again they are developed. A phosphorescent which has lost its power to shine in the dark, recovers this power when a spark of electricity is sent through it. The light now given out passes readily through quartz, while glass is opaque to it. I have examined a great many diamonds in the study of phosphoresence. I have observed that yellow diamonds are invariably phospherescent, and shine with brighter light than others. If after the diamond has ceased to shine in the dark, it be warmed in the hand, it glows again, but only for a short time; this property may be restored successively at increasing temperatures."

NEW YORK ARTIFICIAL RIVER.

Before the era of railroads, the Erie Canal conferred very superior advantages upon New York, for communication with the great West. Things, however, have undergone a great change since the iron road and the iron horse have been introduced, as these have afforded facilities for communion with the West, by Pennsylvania and other routes equal to those of New York. Much of the inland traffic, therefore, has of late years been diverted from old channels, and our merchants and those who are interested in our canals have become greatly alarmed, and have lately met at Rochester, N.Y., to concoct measures for, and urge the enlargement of the Erie Canal, so as to improve its capacity for larger boats, especially steamers. The Chamber of Commerce of this city has also published a report and resolutions, urging this improvement; and a very strong influence seems to be exerted among various parties and classes to accomplish this object, so as to make this canal like a river of moderate depth, for floating boats that shall be capable of carrying heavy freight and large cargoes, at a small cost. According to the mode in which most of our railroads have hitherto been managed, such a canal improvement would defy their competition, and those who are now actively engaged to bring about such results seem to have looked somewhat deep into the subject. While we acknowledge this, we cannot overlook the fact that our railroads are but in their infancy, and thus far they have received but very indifferent nursing. With improvements, by new inventions and superior management, we consider that it is not unreasonable to expect that a great revolution will yet be effected in our railroads, and that twenty years hence, they will be operated at one-half the cost now incurred for doing any fixed amount of work.

HOW THE PYRAMIDS WERE BUILT.

A correspondent suggests that the mode by which the stones used in building the pyramids of Egypt were raised to their places was by piling up immense inclined planes of sand, up which the blocks were pushed on rollers. The statement, often repeated, on high authority, that the pyramids were built before the Egyptians acquired the art of writing hieroglyphics, proves, on closer examination, to be erroneous. The few hieroglyphics, however, which they do contain, do not convey that full knowledge of the state of the arts among them, at the time the pyramids were constructed, which is to be learned from the writings and pictures in their tombs and temples, in regard to the state of their arts at a subsequent period. But we have the less valuable authority of Herodotus, that the blocks of stone were lifted from one course to the other, up the steps of the pyramid. Remains of Cheops' grand causeway, for transporting the blocks quarried from the rocks on the east bank, are still seen leading up to the great pyramid from the plain—a shapeless ridge of ruinous masonry and sand. According to Herodotus, it was 1,000 yards long, 60 feet wide, and 48 feet high, was adorned with figures of animals, and was a work of ten years. Some of the stones used for the coping over the passages, are seven feet thick, and more than seventeen feet long. Lifting these stones up the sides of a pyramid 450 feet high, was certainly a work of great labor, but as a feat of engineering, it was mere child's play, compared with some of the triumphs of modern science and skill—for instance, lifting the Menai bridge on to its piers, or raising on end, and placing on to its pedestal, the monstrous monolith which adorns the city of St. Petersburg.

ROOFING THE VICTORIA BRIDGE.

This, the greatest tubular bridge in the world, is now being roofed with tin plates. The Montreal *Herald* gives a brief description of this operation, as follows:—

"About ten plates are soldered together, and by a peculiar process are nailed by strips of tin to the roof, having previously been tapped by ridges to corresponding strips of soldered plates. These ridges, about one inch high, extend from the top to the bottom or edge of the roof, and are so constructed that they expand or contract with the tubes upon which they rest. Another peculiarity in the process is that they are perfectly water-tight, not a lap or nail being seen over the whole extent of the roof. Mr. Martineau (the contractor) will use about 1,400 boxes, each box containing 112 plates. A great number of tradesmen, many from the United States, tendered for the work; but the report of the engineers, after witnessing the peculiar advantages of the 'standing groove' roof, awarded the undertaking to Mr Martineau."

A small locomotive is used for carrying the plates to the workmen, a great number of whom are busily engaged, so as to get through with the roofing at an early date.

CANADIAN LUMBER.—No where in the whole of America will you see such magnificent and valuable rafts of lumber as on the Ottawa. Those on the Delaware, Ohio and Mississippi are not to be compared to them, either in size or in the value of the wood of which they are composed. Far back in Canadian woods the logs are cut in winter time; in spring they find their way singly down tributary streams to the Ottawa, where they are bound together into rafts and floated down to Quebec, or they are worked-up by the magnificent saw-mills along the valley, which cut up over 200,000 logs per season. An interesting feature in the lumber transport are the timber-slides—an ingenious piece of engineering for the purpose of getting the logs over the rapids. On the construction of these, the government has already spent something like $500,000.