

THE LAST OF MOREAU-VAUTHIER'S "PARISIENNE."

It is doubtful whether any piece of sculpture at the Exposition attracted so much attention, or was so generally discussed, as the symbolic statue representing the city of Paris. Moreau-Vauthier cast all artistic traditions to the winds when he represented the city of Paris, not by a draped allegorical figure, but by a modern Parisienne, dressed à la mode, and carrying herself with that air of sprightliness which is considered chic.

As the buildings of the Exposition were destroyed, one by one, the turn of "La Parisienne" finally came. From her perch, 150 feet in the air above the Place de la Concorde, she was slowly lowered with a derrick and tackle, and was safely deposited on the ground, after a full day's work.

The fate of the statue, according to L'Illustration, is still a matter of conjecture. Rumor has it that the superintendent of the work of demolition intended to send "La Parisienne" to his native town, situated in some part of Auvergne, but that a Hungarian magnate had purchased her with the intention of setting her up on his estate.

RESTORING ST. MARK'S, VENICE.

I THINK no better proof of the progress Italy has made during the last twenty years in true artistic taste and sentiment is needed than the fact that, whereas not so very long ago Ruskin appealed to England for a fund to enable copies to be made of the invaluable mosaics and carvings in St. Mark's Church, Venice, before they fell into complete ruin, it is now the Italian government itself that has taken in hand their saving and their restoration, and England has now only to look on with approval, says the correspondent of The London Globe. Ruskin, in his later days, was apt to imagine that he had preached in the desert, but were he alive now he would see that here in Venice his teaching has not been thrown away. The Ministry of Public Works has realized that to restore means to restore, and that to destroy an ancient thing and to replace it by a modern one is not to restore it. Before the new order of things, when anything was considered unsightly it was pulled down, often thrown away, and common work of the period set up in its stead, with the result that the thing "restored" was not ancient, nor valuable, nor beautiful, nor durable—not even a good copy, since the workers then had neither artistic eye nor taste. Now, however, this is all changed, and the government, by the appointment of the right men for the work, has insured that St. Mark's should be preserved and restored as nearly as perfectly as is humanly possible.

Any one who sees St. Mark's after an absence of a few months will at once be struck by the manner in which the old "Opus Alexandrinum" mosaic work, with which the church was originally paved, and of which so little remained, has spread itself out over the flooring. All round the great white slabs under the central dome, in the two transepts, and down the right aisle, all is rich in subdued color. The disfigurements of the last two centuries have disappeared. The hundreds of bits of common, rubbishy, Verona, Brescia and Carrara, with which the original valuable tesserae had been replaced, have been emptied into the yard behind the church, and the lovely tesserae of porphyry and verd antique, jasper and malachite, once more occupy their rightful place—priceless material lately excavated from the ruins at Aquileia, Concordia and Cyrao. It is not so much, however, the beauty of the material that is so striking as the masterly manner in which the work is done. It is really hard to believe that the inequalities of the pavement and the worn appearance of the tesserae is not the work of time and of the treadings of many feet, instead of being the result of ingenious and anxious study. I learn that the architect, before undoing any part of the pavement, takes a plaster cast of it, numbering the position of each of the ancient tesserae, and from this he forms his restoration, having each separate bit hand cut and ground to the exact size and shape of the one it is to replace. Where a pattern is half old and half new it is impossible to tell where the one begins and the other ends. It is really what some one has called "The Philosophy of Restoration." If any one wishes to see in what a disgraceful condition the whole pavement was in up to very lately he has only to look at any portion not yet restored, such as the left aisle, which was cobbled by a local factory in the ignoble days of thirty years ago, or in front of the altar of the Virgin, where one sees a few bits of antique marbles lost in a wide stretch of common Verona and Carrara tesserae, a crooked square stone filling one blank, and great blotches of plaster the others, making the whole look for all the world like a beggar's coat. Forming a striking contrast to this particular blot upon the harmony of the church is one of the finest bits of restoration that have been done. It is a huge rose of geometrical pattern formed of the richest porphyries and verd antique, radiating from a center; and this center, an offering, I believe, of the architect himself, is a thick slice of an exquisite amethyst, over three inches in diameter. If the unrestored part I spoke of above is like a beggar's coat, this one can only be likened to a king's robe of state.

Other improvements are giving back its richness to the church. A splendid slab of verd antique, found in the rubbish heaps with which the various recesses of the church were found to be filled, has been sliced in two, and now one half forms the front of the altar of St. Peter, and the other the center of a panel in the Zeus Chapel. The passages leading to the sacristy and to other chambers have all been lined either with marble or with gold mosaic. The great cupolas have now been given back to their original splendor, the decayed and blackened plaster, in which their mosaics were embedded, and which had dimmed their luster, has been scraped away, and each tessera secured by good cement, so that now the old colors shine out once more to full advantage. Much other work has been done, but I have said enough, I

think, to show that government and architect are doing credit to themselves and to St. Mark's Church.

CONVERSION OF PHOSPHORUS INTO ARSENIC.

From the German of Prof. F. FITTICA, of the University of Marburg, in the Leopoldina.

THE opinion has been expressed by Flückiger that the modification called black phosphorus consists only of arsenic, and he explains its existence in ordinary phosphorus by its apparent production by means of the action of ammonia on the phosphorus, on the supposition that ordinary phosphorus contains a mixture of arsenic, the phosphorus dissolving in the ammonia, with production of Ph_3 , while the arsenic remains intact.

My researches, however, have led me to conclude that in the reaction of phosphorus, or arsenic, in presence of air, a veritable conversion of phosphorus into arsenic takes place, and that the latter seems to be an oxy-nitrogenized compound of phosphorus.

First, I will confirm the observation that in treating ordinary phosphorus with a concentrated solution (20 per cent) of ammonia by the water bath at about 60 deg. C. (the phosphorus being then liquid), shaking frequently to facilitate access of the air, the latter is transformed into the black modification; in reality, is converted into arsenic.

The operation succeeds best in a flat-bottomed bottle, of a capacity larger than would be necessary for the quantity of substance employed, in order that a larger surface may be presented to the air. The bottle, fitted with a long glass tube, designed to prevent as much as possible the evaporation of the ammonia, is removed from the water bath from time to time and shaken for a moment, in order to bring the contents in contact with the air. The quantities of arsenic thus obtained are, however, very small. I have, therefore, employed more energetic oxidants than the oxygen of the air, taking, in the first place, hydrogen peroxide.

On treating the phosphorus with concentrated ammonia, adding a solution, recently prepared, of hydrogen peroxide, and leaving the mixture at repose at the ordinary temperature, for a certain time, I obtain larger quantities of arsenic. Even in this case the quantities have been quite restricted, insufficient to confirm the surmise I had formed that there was not a contamination of the phosphorus by the arsenic, but a real production of the latter.

For the purpose of securing a sure foundation for my conclusions, I examined red phosphorus and white phosphorus, with reference to their proportion of arsenic. I found that, with equal quantities of phosphorus, I obtained variable quantities of arsenic, whether using white or red phosphorus, or with different oxidants.

Generally the red phosphorus yielded a larger proportion of arsenic by the usual oxidation with nitric acid, and especially by employing barium biniodide with nitric or chlorhydric acid, or potassium chlorate and chlorhydric acid. The same sample of white phosphorus, which, with dilute nitric acid, yielded scarcely appreciable traces of arsenic, yielded with the same acid concentrated very sensible quantities, and larger still with barium peroxide and nitric acid; 0.4294 grain of phosphorus yielded 0.0142 of arsenic sulphide, corresponding to 2.5 per cent of arsenic; 0.501 of phosphorus yielded 0.02012 of arsenic sulphide, corresponding to 2.5 per cent of arsenic. From amorphous phosphorus, more than 2.6 per cent of arsenic can be thus obtained, 1.3981 grains yielding 0.049 grain of As_2S_3 , corresponding to 2.13 per cent of arsenic; 0.2266 yielding 0.010 of As_2S_3 , corresponding to 2.64 of arsenic.

The yield by the oxidation of barium peroxide and chlorhydric acid is slight, and I have not succeeded in obtaining suitable results by employing varying quantities of the same substances. But when 1.02 grains of amorphous phosphorus was oxidized by mixing carefully with barium peroxide and heating the mixture with dilute sulphuric acid, or adding to the mixture water and concentrated sulphuric acid (for 1 grain of phosphorus 13.63 grains of BaO_2 and 3 grains of H_2SO_4), the slight traces of precipitate obtained by the hydrogen sulphide in the product of complete oxidation, from which the barium sulphate was separated by filtration, were found to be pure sulphur completely soluble in carbon sulphide. The precipitate extracted by ammonia yielded a trace of a substance, which was also completely soluble in CS_2 and burned on a platinum plate with a blue flame.

It was, therefore, manifest that the production of arsenic proceeding from the phosphorus was due to nitric oxidants and the employment of ammonia. Then I endeavored to effect a synthesis of the arsenic by employing nitric acid and ammonia at the same time, and also by employing nitrites. If ordinary phosphorus is heated by the water bath, in a tube connected with a condenser, with ammonium nitrate, no reaction takes place under 60 deg., but the action then becomes so violent that explosions may occur, even in presence of ammonium carbonate, on account of the well-known fact that phosphorus burns in the vapor of ammonium nitrate exactly as in a current of oxygen.

When phosphorus is heated with ammonium nitrate and potassium nitrite, in presence of ammonium carbonate, an excessively violent action occurs at a temperature of about 100 deg.

Amorphous phosphorus appears more suitable for the synthesis; and, after many fruitless experiments, I succeeded by the following process, which, so far as I can now state, affords a yield of 8 to 10 per cent of the crude product:

Two grains of amorphous phosphorus, free from arsenic, according to a previous test, are carefully mixed with 12.9 grains of ammonium nitrate finely pulverized, placed in a tube, which should not be too contracted, and heated by the sand bath, so as to attain the temperature of 180 deg. A reaction is produced, which should be moderated, if necessary, by removing the flame. Then the temperature is gradually raised to 200 deg. When the reaction is terminated, the mass is left to cool, then dissolved in water, and the solution filtered and precipitated by

hydrogen sulphide. The precipitate is dissolved in ammonium carbonate, and the arsenic sulphide, precipitated from the solution, may be identified by the manner in which it behaves with ammonia and chlorhydric acid, by its oxidation in arsenic acid, and its precipitation with a magnesian solution, as well as by a test of the magnesian precipitate in the Marsh apparatus.

Taking account of the decomposition of the ammonium nitrate by the heat and the proportions given above for the phosphorus and the ammonium nitrate, the formation of arsenic by means of phosphorus takes place according to the following equation:



Besides the principal reaction, there is at least one secondary reaction, as may be seen by the production of white fumes having a neutral reaction. These fumes may be collected in water, which dissolves them. They contain phosphorus, and yield sulphur free from hydrogen sulphide. To correspond to the equation above, the arsenic would be an oxy-nitrogenized compound of phosphorus, of which the formula would be PAz_2O .

DISPOSAL OF HOUSE REFUSE IN BRADFORD.

THE population of Bradford is estimated at 292,300; the acreage is 22,843; the average number of people per acre 12.8, and the ratable value is £1,396,067 7s. 6d. The total quantity of refuse collected is 125,000 loads per annum from 32,164 ashpits, to which 180,000 visits are paid, giving an average of 3.87 loads per ashpit and 5.6 per annum to each.

At the present time about 90,000 loads are destroyed annually at the destructors, the remainder being either tipped in the out-districts or sold to farmers. The total number of destructor cells is 53, being 29 at work, 6 rebuilding, and 18 to be erected. These when complete will have a total destroying capacity of 145,000 loads per annum.

The destructors are of the Horsfall pattern, each one consisting of two blocks of six cells of the back-to-back type, with two 11 feet by 8 feet multitubular boilers, the chimney being placed between the two blocks. Each block of cells has a flue leading to one of the boilers and an alternative flue leading to the chimney. Some improvements in details of construction have been introduced, and air flues have been made under the tipping-floor, which keep it cool by the induced current of air passed through them by means of a steam-jet. An overhead railway is also provided for the removal of the clinker. A working test of the destructor gave the following results:

TEST OF THE HORSFALL DESTRUCTOR, JUNE 24 TO JULY 7, 1900.

Number of cells: 12.
Type: Back to back.
Duration of test: 278 hours.
Nature of fuel: Middlen, market and dry refuse.
Number of men employed: 12 furnace men, 6 chargers.
Wages: Furnace men, 28s.; chargers, 25s.
Total quantity of refuse burned: 2,896,320 pounds = 1,293 tons.
Total quantity of refuse burned per cell per 24 hours: 20,837 pounds = 9.3 tons.
Total cubic feet of refuse burned per cell 24 hours: 543.
Total quantity of refuse burned per square foot of grate per hour: 34 pounds.
Total quantity of refuse burned per cell per hour: 868 pounds.
Cost of labor per ton destroyed: 9d.
Total weight of water evaporated: 2,153,000 pounds.
Total weight of water evaporated per hour: 7,744 pounds.
Total weight of water evaporated per cell per hour: 645 pounds.
Water evaporated per pound of refuse burned: 0.743 pound.
Water evaporated per pound of refuse burned from and at 212 degrees F.: 0.882 pound.
Weight of clinker produced: 817,516 pounds = 364.96 tons.
Weight of fine ash produced: 26,936 pounds = 12.02 tons.
Weight of fine dust produced: 5,992 pounds = 2.67 tons.
Total weight of residuals: 850,444 pounds = 379.65 tons.
Percentage of residuals: 29.36 per cent.
Steam pressure maintained (by recorder): 60 pounds.
Temperature of feed-water: 60 degrees F.
Temperature of gases in main flue: 1,800 degrees F.
Temperature of gases at bottom of chimney: 1,000 degrees F.

Average air pressure (water gage): $\frac{7}{8}$ inch.
Total I.H.P. per hour at 20 pounds: 387.2.
Total I.H.P. per cell continuously: 32.2.
I.H.P. hours per ton burned: 83.2.
The main importance of the installation lies in the arrangements for turning the residuals to profitable account. The steam produced is partly utilized in driving eight mortar mills, which turn out mortar at the rate of 12,000 tons per annum, and for working hydraulic machines, which are used in the production of artificial stone slabs for paving. Concrete bricks, consisting of a 10 per cent mixture of hydraulic lime and clinker, are also manufactured at a cost of 14s. per 1,000. A small machine turning out 8,000 bricks per day requires over 20 tons of clinker for that purpose; and the manufacture of ornamental tiles from the same material is being commenced. Sifted clinker of various grades is also disposed of by sale, and old tins, scrap iron, etc., go to chemical works, scrap merchants, and others. In addition to the machinery above mentioned there is a complete plant for the manufacture of artificial guano from the fish refuse, of which from 600 to 700 tons are dealt with annually and reduced to 25 per cent of its original bulk, making a profitable product which is sold at £3 per ton.
The new destructor being erected will reduce the labor for tipping and charging, and is expected to