On the Action of Water on Lead ; read before the Royal Society of Edinburgh. By Dr. CHRISTISON.

The author, after briefly stating the results of his experimental inquiries, published on this subject in 1829, proceeded to describe two instances which had recently come under his notice, illustrative of the solvent action of certain terrestrial waters on lead, and of the danger of using this metal for conducting water in pipes, unless with a due regard to the circumstances which promote, or prevent, its corroding property. In one instance, the water of a spring, conveyed in a lead-pipe from a distance of three quarters of a mile, was found to act so powerfully on the lead, that in a short time the cistern in which the water was collected became covered with loose carbonate of lead, and the metal could easily be detected in the state of oxide dissolved in the water. In this case, the action was found to depend on the spring being of extraordinary purity, its total saline ingredients being only a 22,000th part. In the other instance, water conveyed half a mile in a lead pipe, was impregnated exactly in the same way, and with the very same phenomena—but with the additional circumstance, that, in consequence of the impregnation not having been detected in time, as in the previous case, the disease, *Colica pictonum*, broke out in the house supplied with the water. In this case, the water was by no means pure, as it was found to contain no less than a 4,500th part of saline matter. But there was scarcely any other salt present except muriates, which the author had ascertained in his former researches not to prevent the action of water on lead, unless present in much larger quantity.

He next proceeded to explain in what manner the action of the water was put an end to in both these cases. In similar instances, the only remedy formerly thought of was substitution of iron-pipes. In the former of the two cases which fell under his notice, the water was left at rest in the pipe for four months, till a firm crust of mixed carbonate and sulphate of lead had crystalized on the lead; after which no farther action took place. In the latter instance, the same end was attained by keeping the pipe full of a solution of phosphate of soda, consisting of 27,000th of the salt.

The author appended an analysis of the compound formed by the action of distilled water on lead. Guyton-Morveau and others considered it a hydrated oxide; the author himself, in 1829, thought it a neutral carbonate; and, in 1834, Captain Yorke first considered it a hydrated oxide, and eventually concluded from his analyses, that it is an irregular mixture of hydrated oxide and carbonate of lead. The author finds that the product is a hydrated oxide, when the action goes on without the access of carbonic acid; but that, when the action proceeds in the usual way, under exposure to the atmosphere, the product is a crystalline body, of which the primitive form seems to be the regular octahedron, and which is composed of two equivalents of neutral carbonate, united with one equivalent of hydrated oxide ($2 \text{PbOCO}_2 + \text{PbG Aq.}$)

He then stated the following to be the general conclusions to be

drawn in a practical point of view, from his present and previous inquiries as to the use of lead for conveying water :

1. Lead-pipes ought not to be used for the purpose of conveying water, at least where the distance is considerable, without a careful chemical examination of the water to be transmitted.

2. The risk of a dangerous impregnation with lead is greatest in the instance of the purest waters.

3. Water, which tarnishes polished lead, when left at rest upon it in a glass vessel for a few hours, cannot be safely transmitted through lead-pipes without certain precautions.

4. Water, which contains less than about an 8000th of salts in solution, cannot be safely conducted in lead-pipes, without certain precautions.

5. Even this proportion will prove insufficient to prevent corrosion, unless a considerable part of the saline matter consist of carbonates and sulphates, especially the former.

6. So large a proportion as a 4000th, probably even a considerably larger proportion, will be insufficient, if the salts in solution be in a great measure muriates.

7. In all cases, even though the composition of the water seems to bring it within the conditions of safety, now stated, an attentive examination should be made of the water, after it has been running for a few days through the pipes. For it is not improbable that other circumstances, besides those hitherto ascertained, may modify the preventive influence of the neutral salts.

8. When the water is judged to be of a kind which is likely to attack lead-pipes, or when it actually flows through them impregnated with lead, a remedy may be found either in leaving the pipes full of the water, and at rest for three or four months, or by substituting for the water a weak solution of phosphate of soda, in the proportion of about a 25,000th part.

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English Patents.

Specification of a Patent granted to WILLIAM COTTON, Esq., of Leytonstone, for an improved Weighing Machine. Patent dated June 13, 1842; Specification enrolled August 10, 1842.

Mr. Cotton, who is Governor of the Bank of England, has invented this machine for the purpose of weighing sovereigns, and separating the light ones from those of standard weight. It is so delicate, that it detects, with precision, a variation of a twelve thousand two hundred and fiftieth part of the weight of a sovereign. The coins are placed in a tube, or hopper, from whence they are carried on to a small platform, which is suspended over a delicately poised beam, to the other end of which is appended the standard mint weight. On setting the machine at work, a sovereign is placed on the platform, and if it is full weight, a small tongue advances, and strikes it off into a till appointed to receive it; but, if it is light, the platform