had worn such a cavity in the end of the brass, as to bury itself completely within it. It appeared also that there was much wear both on the journal and in the box, and that unless an axle possessed the means of having its brasses tightened up endways, oscillation and abrasion were inevitable.

A journal and its cones of the improved form, which had run over 21,000 miles on the South-Western Railway, exhibited no visible amount of abrasion, and Captain Handcock contended that the practice confirmed his previous ideas.

Mr. Field thought the form of the axles a decided improvement. Mr. Field. They were somewhat on the principle of those which had succeeded so well for common roads, and he believed that they must prove of considerable advantage for railways.

Mr. Fairbairn approved of the construction of the journals, and Mr. Fairbairn. had no doubt of their practical efficiency; he particularly liked the cones, as in addition to their affording the means of preventing lateral motion and diminishing the friction, their form added strength to that point near the shoulder where it was most wanted.

Captain Handcock stated that the average consumption of oil on Captain Handcock railways, was for an engine and tender with common axles and brasses, about 6 lbs. for 110 miles; of this quantity, 2 lbs. were used for lubricating the axles.

General Pasley observed that his attention had been drawn to these Major General Pasley. axles, and although on account of his official position, he scrupulously avoided giving any opinion on the merits or demerits of an invention, yet he might say that if he was a proprietor of a railway, such was his opinion of Captain Handcock's axles, that he certainly would give them a trial.

No. 622. "On the application of Zinc by the process of Electro-deposition, for the preservation of Iron, as applied to Engineering and other purposes." By Frederick Pellatt.

The object of the paper is to direct attention to the properties of Protection of Iron by the Electro-deposition of Zinc. zinc as a protecting coating for iron; to describe the processes already employed for that purpose; the reasons of their failure, and the peculiar fitness of the process of electro-deposition of metal for the purpose.

Iron is, it is stated, from its superior affinity for oxygen, liable to rapid decomposition, and it has ever been a desideratum to discover some cheap mode of protecting it; the ordinary methods of painting and tinning not being sufficiently lasting.

By the laws of electricity, when metals are in contact, the negative

metal is protected at the expense of the positive; and under all ordinary circumstances zinc being the positive metal, it becomes a protector to the negative metal—iron. Zinc, like most metals in commerce, is not to be met with pure; in the other metals, however, the impurities do not generally tend to the injury of the metals with which they are combined; such, however, is not the case with zinc and its impurities, as when in contact with moisture, they generate a galvanic action by which the zinc is rapidly destroyed.

Those who have made use of zinc, especially where it has been exposed to exciting fluids, such as milk, or any other fluid easily converted into acid, are well aware of the rapidity of its destruction.

The impurities existing in ordinary zinc are then noticed, as well as the difficulty and costliness of the process of sublimation, in order to refine it. It is also contended that impure zinc being in itself so easily destructible, is of little value, as it cannot afford protection to any other metal which may be coated with it: and therefore the mode of plating iron with melted zinc (of commerce,) must be objectionable.

The Report made to the French Academy by Monsieur Dumas, is quoted, in which he says: “the zincing of iron by steeping it in a bath of melted zinc, has many inconveniences: besides, the iron combining with the zinc, constitutes a very brittle superficial alloy, the iron losing its tenacity. The presence of foreign matters used in the process, in order to keep the zinc in fusion, increases the amount of impurity, and being less fusible than the zinc, a great loss is created in consequence of the zinc volatilizing at a high temperature.

It is well known that in the deposition of metals from metallic salts by the electro-process, the pure metal only is deposited, so that the process described in the paper, is not open to the objections against ordinary metallic coatings. The iron also being coated with zinc in a cold solution, its state is in no way changed. The expense of the process is stated not to exceed that of four coats of oil paint.

Though to men of science the properties of zinc in connexion with other metals have been well known, (and the opinion of Drs. Graham, Kane, Daniel, and Monsieur Dumas, are quoted on the subject), yet practically this knowledge has not been much applied, chiefly from the difficulty of obtaining pure zinc. The electro-process, it is stated, entirely overcomes the difficulty; at the same time it affords facilities for covering iron-work of any form or size, and as it requires no great outlay, the process may be carried on in any locality.

Zinc has another great advantage: although it is easily oxydized, the oxyde in ordinary circumstances is insoluble, and affords a protection to the metal below. For roofing and many other purposes, of which a long list is given, it is suggested that zinced iron would be found very useful.