parts submitted to unnecessary heating will crystalize, and as a matter of course, become weak or brittle. In piecing or lengthening shafts, or large forgings of any kind, Mr. Muir recommended that when lays were used for the purpose, the scarfs of those lays should be left tolerably thick at the points. If they are thinned too much, the air acts upon them when drawn from the furnace, and they are sure to be too cold before reaching the anvil. The consequence will be disastrous if this contingency arise. You must then take another heat, without the certainty of being better off next time. It may become a sound union, but will it stand up to the required fire? As has been said, it is desirable in all cases to have the scarfs of the lays of a proper thickness to avoid these evils.

With regard to furnaces, Mr. Muir entered into some interesting particulars, for which we have not space, but he remarked that, when the work to be done was never likely to exceed a foot in thickness, he should suggest the following as proper proportions for the furnace:—3 ft. wide, and 22 in. high. At the door way the fire-grate would thus be 3 ft. by 3ft. The neck or flues should be 20 in. deep, and 14 in. wide. The chimney-stack should be at least 36 ft. in height, and the orifice 18 in. in diameter. The reader of the paper was rather disposed to invert the rule with regard to the taper usually given to the inside of furnace chimneys; he would have them wider at the top than at the base. He prophesied that, if such a plan were adopted, there would be fewer complaints in reference to defective draught.

Mr. Muir proceeded to remark upon the desirability of employing workmen who had theoretically and practically a knowledge of the material with which they had to deal, and of paying them in proportion to their merits.

A discussion followed, which was of an eminently practical character. Mr Onbridge complained that the vital question of the quality and kinds of fuel to be used in the preparation of forgings had not been touched upon.

Mr. Ives thought that further information might have been given as to the making up of forgings, the proper lay of the grain, so as to combine tightness with strength, &c.

Mr. Gray made some remarks of a similar tendency.

Mr. Stanly, in reference to a statement made by the reader of the paper, as to the superior strength of beams which tapered from the centre instead of being parallel, thought that such beams should not have a straight, but a curved, or parabolically curved, taper, in order to give the maximum of strength.

Mr. Seccomb was much more ready to undertake a forging than to talk about it. He entered, however, into some practical details in reference to forgings, which demonstrated his capability for both talking and working.

Mr. Stapho spoke at some length, and though approving of what Mr. Muir had said, pointed out numerous items of interest in relation to the subject which had been left unnoticed.

The Chairman must admit that he, too, felt a little disappointed with the paper. So far as it had gone, it was all very well, but it had not gone far enough. It was to be hoped that Mr. Muir would take an early opportunity of supplementing his work, and that other members of the Association who were so well qualified to enlighten and instruct would assist in the task. A more appropriate subject it would be difficult to find for the consideration of that Society, and it ought to be treated of in all its varied points. He was not without hope that the question of "Forgings in Iron" would ere long be re-opened in that room. Mr. Newton further suggested that the claims of the Messrs. James to the founding of the railway system as opposed to those of the Stephenson's, formed a legitimate and proper field of inquiry for the Foremen Engineers, whose object was to elicit truth and maintain it.—*Mechanic's Magazine.*

ON COLOURS, PERMANENT AND FUGITIVE.*

Colours, artist colours, may be classed as inorganic and organic, and may be described as being either permanent or fugitive, transparent or opaque. Their transparency or opacity, however, being more strictly artistic qualities, will not, except in the case of new claimants for palette fame, be remarked upon. As is their due, those pigments shall have precedence which are permanent, whether obtained from metals and earths, or from the vegetable and animal worlds.

Permanent Pigments.

Inorganic Yellows.

Aureolin.—There has, until within the last year or two, been wanting a yellow at once permanent, transparent, brilliant, and pure in tint. This void aureolin fills. The preparation being a trade secret, I shall not in courtesy enter into its composition, or attempt to describe a means of producing it. Suffice it to say that the colour is extremely beautiful, and, to my knowledge, is quite uninjured by air, light, time (that great enemy of artists), sulphuretted hydrogen, or by admixture with other pigments.

Cadmium Yellows are obtained from cadmium and sulphur. Being sulphides, they are not affected by impure air, and the deep gorgeous varieties may in other respects be safely relied upon. Those of a pale lemon hue should be regarded with suspicion. There were several samples of that tint shown at the International Exhibition both by foreign and British colour makers, but all, without exception, became, I noticed, gradually coated with white.

Lemon Yellow, produced from barium and chromium, when skilfully prepared, is a safe, reliable colour. Unlike chromates in general, it is not sensibly altered either by light or a foul atmosphere.

Mars Yellow is an artificially prepared ochre, of which the chief constituents are iron, silica and alumina. When pure it is a most stable pigment, of a clear, sober, gravel tint.

Except with respect to colour, the same remarks are applicable to the native iron earths, such as yellow ochre, Roman ochre, &c.

Organic Yellow.

Cyanogen Yellow, in the preparation of which, as its name denotes, cyanogen in some form or other

* From a paper on Picture Chemistry, by Thos. Salter, F.C.S., in the *Chemical News.*