

should be solid, and a plain brace from the runner to the knee, allowing the back one to run up to the body at a point a little below the seat, also a brace from each knee to the fender, are all that are required. A seat-brace should be run from the front knee to the runner on which should be welded an eye for the thill-coupling; care should be taken to get the eye at a point, so that when the thills are on and lifted to their proper height the runners will run level. For shoes use the best cast steel; it pays in the end. The track varies from three feet to three feet six inches, or even three feet eight inches on the heavier sleighs.

A very pretty style of painting is to use lake on the body, for black moldings, edged with a fine line of deep red, and paint the running part a light cream color, with lake stripes, edged with red.

The most fashionable trimming is plush, of different shades of saffron, although rep is used a good deal with very light sleighs. There is often no trimming except the cushions, the inside being made very smooth and painted in some plain color, with robes substituted for trimmings.

A very handsome four or six passenger sleigh can be made by using the style we have described for the back, and a wing-shaped front; in a six-seat sleigh the inside seat should not be higher than the back seat, while the driver's seat should be at least ten inches above it. A fluted molding looks the best, on a large sleigh, and, if the body is painted black, the fluting should be striped its full width with deep red. But little ornamentation is used at the present time, a pretty monogram on the panel or seat being about the only thing that is countenanced, and this is generally put on with the same colors that are used for striping; if gilt is used for striping it should also be used for the monogram.—*Shoe and Leather Reporter.*

Imperfection of Malleable Iron.

It has for some time past been known, that the fibrous nature of iron, long considered an element of its strength, is in reality, due to the presence of foreign matters, which are taken up during manufacture, and prevent the adhesion of the adjacent particles of iron, however carefully or powerfully the metal may be compressed, or however it may be twisted, doubled up or contorted. The effect is similar to that which occurs with a glass tube hermetically sealed at both ends; however it may be drawn out, however often it may be doubled or twisted together, at even a very high temperature, the air, a foreign substance within it, will prevent the union of its particles, and cause it to have a fibrous appearance, without adding to its strength, but the contrary.

The imperfection of malleable iron from this cause has now been found far greater than was suspected. It has been shown, by experiments made on French and English armor-plates, that, however homogeneous they may seem when cut and polished, whether formed by the rollers or the hammer, they consist of laminæ not at all welded together, and presenting an appearance similar to that of a number of sheets of paper. This condition has been revealed unmistakeably by the effects produced by projectiles; and it is found to

be present even when the plate has been both hammered and rolled at a welding temperature.

This discovery assumes a still more serious character, if possible, when there is question of such forgings as railway axles, screw shafts, the shafts of marine engines, and other portions of machinery, the soundness of which is of vital importance. It explains the difficulty of constructing large forgings of requisite strength; and leads, unfortunately, to the conclusion, that without fusion, as in the case of steel, there can be no adequate security with regard to the homogeneity, and therefore the strength of the material.

The intense heat employed in the manufacture softens the scoriaceous matters, but they are never expelled. This is true to a greater or less extent, even with charcoal iron. The only advantage possessed by the charcoal iron, in this respect, seems to be that the laminæ do not separate during fracture under the blow of a projectile, which is a most trying test of the amount of their adhesion.

It is worthy of notice that the laminæ are more distinctly perceptible, the better the iron, and the more capable of resisting fusion at high temperatures. Fusion seems to be an indispensable condition for the prevention of a laminated structure; hence the excellence of metal such as steel, which is subjected to fusion during manufacture. When fusion has taken place, the rolls and the hammer impart new and valuable qualities. The so-called fibrous character of iron causes its practical to be far less than its theoretical power of resistance; and when it begins to give way in the shafts of marine engines, etc., the fracture commences along lines of junction of the laminæ; and the results of numerous experiments seem to show that, while the welding is very imperfect in those portions to which the shock of the hammer cannot reach; it is in all more or less faulty.—*The Scientific Review.*

The Ornamental in Engineering.

BY THOMAS HUGHES, M. P.

WITHOUT attempting further to argue with those who have found the Paris Exhibition a weariness to the flesh, let me jot down for any one who cares to read them a few of the impressions which the World's Fair has left on my mind. Perhaps the strongest of these was produced by one of the buildings in that part of the outer garden appropriated to Great Britain. I mean the *fac-simile* of the mosque of one "Syed Osman."

I am not conscious of ever having heard the name of Syed Osman till within the last fortnight. I only know of him now just so much as the placard in the front of this building tells me, that he lived some four hundred years since, and built the original of this mosque at Ahmedabad, in the year 1458, or thereabouts; on what occasion or with what object, I am perfectly ignorant. It is not, therefore, from historical association that the structure interests me, nor from an architectural point of view; for though pretty enough, it is far inferior to several of the other copies of Eastern buildings in the gardens. Nor from an antiquarian, for not a brick or stone has been brought from India to Paris; and I am told the whole building is composed of the terra-cotta in use at the Brompton Museum. But,