integrity. The smith likes to use it, since it works and welds readily in the forge at low heats. The best manufacturers aim to have a neutral product, which, if it has any tendency at all, is on the side of red shortness.

_Cast-iron_ in bridge-building is so little used at the present day, except in the form of bearing-blocks, post-caps and bases, or washers, that little need be said about it. In its very nature, it is a brittle material, and even while apparently doing good service, may be dangerous-ly near failure. It has an irregular elasticity, and in cold climates it has been known to fracture through the freezing of water that had found its way into unprotected cavities. In the form of _long columns_, it is of course very inferior to wrought-iron. Such columns are exposed to cross strains, and have a tendency to fail by bending and not by crushing. Tension in some part always accompanies a cross strain, to resist which cast-iron is a very uncertain material. Castings may have initial strains through unequal cooling, or they may be thinner on one side than another, or they may be weak through concealed holes, “cold shuts,” or cinder. No human foresight can remove these risks; and especially in bridge-building is it important to reduce all risks to a minimum, and for this reason, if for no other, cast-iron should be discarded for such purposes, except in those places where it would be very expensive to forge wrought-iron, places where none other than a direct crushing strain can ever occur, as previously instanced. The iron from which castings are made should be selected with