

It is obvious then, that those materials best calculated to resist these kinds of force respectively, should, when practicable, without the sacrifice of economy, be employed in the situations where those forces are respectively exerted.

For instance, when the diagonals act by tension, the top rib, (or the arch, in case of the arched truss,) and the verticals, should be composed of the material best adapted to sustaining a crushing force, while the lower rib or stringer, and the diagonals, should be of the best material for supporting tension.

Wood and iron, as before remarked, are the only materials that have been employed in bridge building, (I refer only to the superstructures,) to an extent worthy of notice, and it seems reasonable to conclude, that on these, we must place our dependence.

Cast iron will resist a greater crushing force than any other substance, whose cost will admit of its being used as a building material. Steel has a greater power of resistance, but its cost precludes its use as a material for building. Wrought iron resists nearly equally with cast iron, but its cost is twice as great, which gives the cast iron entirely the advantage. On the other hand, wrought iron resists a tensile force nearly four times as well as cast iron, and 12 or 15 times as well as wood, bulk for bulk.

Not only are these the strongest materials, but they are also the most durable. In fact, with proper precautions, they may be regarded as imperishable.

It would seem, then, that wrought iron for tension, and cast iron for thrust, were the *best* materials that could be employed for building bridges. But wood, though greatly inferior in strength and durability, is much cheaper and lighter, so that making up with quantity for its want of strength, and by frequent renewals for its want of durability, it has hitherto been almost universally used in this country for bridge building, and in the scarcity of means, and the unsettled state of things in a new country, where improvements are necessarily, to a great extent, of a tem-