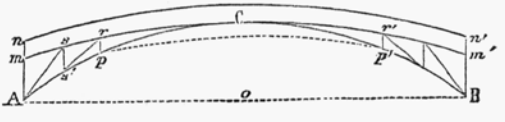
neutral axis, as it will there act with the greatest effect. This object is secured by using only a single arch, and giving it the maximum rise that the nature of the structure will admit. The only objection that can possibly be made to a single arch, we conceive to be its flexibility; but if it can be so counter-braced as to prevent a change of figure by the action of a variable load, we cannot perceive that any thing more is necessary.

If this principle be correct, it follows, that most of the plans which have been used are to some extent objectionable, as they consist either of framed voussoirs, that is, of two parallel arches separated by cross-braces, or of several arches rising at different heights, and extending to different elevations. The latter arrangement would perhaps be a good one, where the object is to distribute the pressure upon many points; but as an abutment can always be made sufficiently strong to resist the thrust of a stone arch, it cannot be supposed that there would be any difficulty in guarding against the pressure of a much lighter structure of cast-iron. Certain it is, that all the arches cannot act at the same distance from the neutral axis, and therefore a smaller quantity of material at the maximum distance would be equally efficient. No new principle is involved in the construction of iron bridges; the strains are disposed, and must be guarded against, in the same way as in wooden structures; the only modifications are those required by the peculiar character of the material, and by the greater difficulty of securing proper connections.

FIG. 72.



A B represents an arch of iron, constructed of plates of considerable lengths, laid upon each other so as to break joint, and bolted together, or in any other suitable way, *C o* being the greatest rise that can be given to the arch.

(*s s'*) are vertical posts or columns, which may be either of cast-iron or wood: the latter would better resist an impulsive