tion of the weight; but, on the other hand, we are sure that
the assertion sometimes made, that either one or the other
necessarily sustains the whole load, is erroneous. Much de-
pends upon the manner of making the connection; if an ordi-
nary truss be constructed, and arches added after it has settled
to a considerable extent, by the application of heavy weights,
it is very clear that the arch will bear but a small proportion
of the load; but if the arch is introduced, previous to the re-
moval of the false works, and both systems be allowed to set-
tle together, it is fair to suppose that the strain upon each will
be in proportion to the respective power of resistance.

The usual method of constructing bridges, is to make the
truss of such strength as is supposed sufficient to support the
weight, and to add the arch as additional security. We think
it decidedly preferable to reverse this arrangement, making the
arch the main dependence, and using a light truss in combina-
tion with it, merely to prevent change of figure in the arch,
and to give the proper elevation or inclination to the roadway.

Let a railroad bridge of 160 feet span be supported by
four arches, the rise of each of which is 20 feet; weight on
bridge, 1\(\frac{1}{2}\) tons per lineal foot—required the dimensions of the
arches to sustain the whole weight.

The whole weight is 240 tons, or 240,000 pounds to each
half of the bridge. The strain upon the arches in the centre
will therefore be \(\frac{240,000 \times 40}{20} = 480,000\) pounds, requiring
480 square inches of cross-section, at 1,000 pounds per square
inch.

Four arches, 16 inches deep and 7\(\frac{1}{2}\) inches wide, could
supply the requisite amount of material. The compression at
the ends will be to that in the centre as \(\sqrt[4]{40^2 + 20^2} : 40\), or
as \(\sqrt{2^2 + 1}: 2\); hence, it will be 480,000 \(\times 1\frac{1}{2}\) nearly, =
540,000, and will require 540 square inches; or, if the arches
are 7\(\frac{1}{2}\) inches wide, as before, the depth must be 18 inches.

If an arch is too small to sustain the whole weight, and is
connected with a truss of given dimensions, the best practical
manner of treating the case is to estimate separately what
each would sustain, allowing 1,000 pounds per square inch;