Ordinary Iron Highway-Bridges.

Minimum size of pine joists should be 3" × 10"; the maximum size that it is advisable to figure on is 4" × 14", because deeper joists cannot always be readily purchased. It is to be remembered that pine lumber can be found in the market in only certain sizes, usually even inches in depth, and always even feet in length; i.e., timbers 3" × 8", 3" × 10", or 3" × 12" are readily procured, while timbers 3" × 9" or 3" × 11" are not; also, if one require joists eighteen feet six inches long, it will be necessary for him to buy lengths of twenty feet, and cut off a foot and a half. Timbers over eighteen feet in length cost more per thousand than those of that and shorter lengths.

Tables XV., XVI., XVII., and XVIII. give not only the sizes of joists, and number per panel, but also the total number of feet, board measure, of pine and oak per panel, including, whenever there is any, waste material.

The total load for a floor beam consists of the live load, the weight of lumber which it supports, and the weight of the beam itself. The latter must of course be assumed: this can always be done with sufficient exactness to determine the floor-beam load. The latter is assumed to be uniformly distributed between centres of bearings.

In calculating the dimensions of a floor beam to sustain a given load, the section of the web is to be assumed; and the beam is to be proportioned according to the formula given on p. 19, and to the principles there enunciated. It may be necessary to make two or three designs, in order to determine the most economic depth; but it will be often found that a variation of several inches in the depth will not affect the weight per foot.

The lower lateral strut, which is to be well bolted to the floor beam, will add considerably to the strength and stiffness of the latter. The joists should be dapped on to the strut at their bearings, so as to offer a resistance to the lateral deflection of both strut and beam.

The lower flange plate, if there be one, need not extend over more than the middle half of the length of the beam. The rivets attaching the plate to the lower flange angles should be staggered, and should be spaced about four inches apart; and