

crowbars, 3 cross-cut saws, 2 augers 1" diameter, 2 augers $\frac{3}{4}$ " diameter, 4 augers $\frac{5}{8}$ " diameter, 3 axes, 2 adzes, 8 timber trucks, 4 monkey wrenches, 4 chains, 2 crabs, 2 holding-on bars, 3 jack screws, several large wrenches for pins, and, if necessary, a pile-driver with its appurtenances. The ordinary weight of a pile-driver hammer varies from sixteen hundred to two thousand pounds; and the height of the driver is about thirty feet. The cost for such an apparatus complete is about two hundred or two hundred and twenty-five dollars.

If the gang be a large one, or if the span exceed one hundred and fifty feet in length, the numbers of some of the tools on the list will have to be increased; for instance, those of the bars, ropes, and timber trucks.

Bridge carpenters generally carry tools of their own: so, if there be much timber work in connection with the bridge, it will be sufficient to employ more carpenters, and not to purchase a larger outfit of carpenters' tools.

In getting ready to erect a bridge, the first step is to prepare the ground in the neighborhood of the site, so that there will be room to store the material and for the men to work. When the iron is received at the site, it should be checked, and any pieces from which the marks have been obliterated should be re-marked. The iron should be piled systematically, similar parts being grouped; and no iron should be allowed to lie upon the ground. It should be piled so that there will be no trouble in getting at any piece which may be required; and the parts to be used first should be placed nearest the bridge site.

The piers and abutments will be supposed to be erected, as this work does not aim to treat of foundations.

The next step is to put the falsework in place. If the bed of the stream be dry, or nearly so, the bottom hard, the distance from the bed to the lower chord less than eighteen feet; and if there be no danger of a sudden rise of water with a swift current, the floor and joists can be used for falsework.

If the distance from the bed of the stream to the bottom chord be greater than eighteen feet, and the other conditions be the same, timber bents on mud-sills will be required. The size of a mud-sill should vary from 6" by 6" to 12" by 12", accord-