THE CARPENTER'S "STEEL SQUARE" AND ITS USES.

BY T. F. HODGSON.

We have recently given two illustrations of the uses of the steel square, and we feel much pleasure now in publishing in full an article which appeared some time since in the *American Builder* by T. F. Hodgson, Architect, Collingwood, Ontario. We regret that we have not space to insert the preliminary remarks made by Mr. Hodgson on this subject, but will proceed direct to the description, given by the writer, how this useful instrument is the best that can be used when properly understood and applied. Such is Mr. Hodgson's statement from 24 years of practical application, both in the United States and Canada, in the erection of many large timber structures :—

The "Square," as a constructive tool, must of necessity have found a place in the "kit" of the earliest builders. Evidences of its presence have been found in the ruins of pre-historic nations, and are abundant in the remains of ancient Petra, Ninevah, Babylon, Etruria, and India. South American ruins of great antiquity in Brazil, Peru, and other places, show that the unknown races that once inhabited the South American Continent, were well posted in the use of the square. Egypt, however, that cradle of all the arts, furnishes us with the most numerous, and, perhaps, the most ancient instances of the use of the square; paintings and inscriptions on the rock-cut tombs, the temples, and other works, showing its use and application, are plentiful. In one instance, a whole "kit" of tools was found in a tomb at Thebes; which consisted of mallets, hammers, bronze nails, small tools, drills, hatches, adzes, squares, chisels, etc.; one bronze saw and one adze had the name of Thothmes III., of the 18th dynasty, stamped on their blades, showing that they were made nearly 3,500 years ago. The constructive and decorative arts at that time were in their zenith in Egypt, and must have taken at least 1,000 years to reach that stage. Consequently, the square must have been used by the workmen of that country four thousand years ago.

The British Museum contains many tools of pre-historic origin, and the square is not the least of them. Herculaneum and Pompeii contribute evidences of the importance of this useful tool. On some of the paintings recently discovered in those cities, the different artisans can be seen at home in their own workshops, with their work-benches, saw-horses, tools, and surrounding, much about the same as we would find a small carpenter's shop of to-day, where all work is done by hand; the only difference being a change in the form of some of the tools, which, in some instances, had been better left as these old workmen designed them.

The young mechanic will now come with me to the workshop, and he and I will talk over this steel square matter in a free and easy manner. We first examine the "Tool" that we are to work with. We find that there has been good judgment displayed in its purchase; the blade is exactly 2 inches wide and 24 inches long, the tongue is $1\frac{1}{2}$ inches wide and 18 inches long; it lies on the work-bench before us with the blade running from the right hand to the left, and the tongue pointing from us. On close examination we find that the inches on the upper side, as it lies on the bench, are divided into twelfths, which form a convenient scale. This division occurs all round the outside edge of blade and tongue. The other edge of this side of the square is divided into quarters of an inch. When the tool is turned over, we find that the outside edge is laid off into sixteenths, and the inside edge into eights. The board rule, which often is of use to the carpenter, is laid off on one side; the brace rule and diagonal decimal scale are found on the tongue. To insure good work and true, it was necessary to be careful in selecting this square, to see that the tongue was exactly at right-angles with the blade, or, in other words, to see that it was square. To test this question, we get a board, about 12 or 14 inches wide, and four feet long, dress it on one side, true up one edge as near straight as it is possible to make it. We lay the board on the bench, with the dressed side up, and the trued edge towards us; we then apply the square, with the blade to our left, and mark across the prepared board with a penknife blade, pressing close against the edge of the tongue; this process done to our satisfaction, we reverse the square, and move it until the tongue is close up to the knife mark, we find that the edge of the tongue and the mark coincide, which is proof that the tool is correct enough for our purposes. Being satisfied on this point, our next step will be to prepare what we shall call, for the want of a better name, an adjustable fence. This is made out of a piece of black walnut or cherry 2 inches wide, and 2 feet 10 inches long (being cut so that it will pack in our tool chest), and $1\frac{5}{8}$ inches thick; we run a saw kerf cutting down these guage lines at least one foot from each end, leaving about ten inches of solid wood in the centre of fence. We now take our square and insert the blade in the saw kerf at one end of the fence, and the tongue in the kerf, at the other, the fence forming the third of a right-angle triangle, the blade and the tongue of the square forming the other two sides. Our next step will be to make some provision for holding the fence tight on the square; this is done by putting a No. 10 $1\frac{1}{2}$-inch screw in each end of the fence, close up to the blade and tongue; having done this, we are ready to proceed to business.

We will now take the square and the fence as shown at A, leaving the fence loose for further adjustment.

Our first attempt will be to make a pattern for a brace, for a four-foot "run." Taking a piece already prepared, six feet long, four inches wide and half-inch thick, guage it three-eighths from jointed edge.

We take the square as arranged at A, and place it on the prepared stuff, as shown at *c*, Fig. 2. Adjust the square so that the twelve-inch lines coincide exactly with the gauge-line 0, 0, 0, 0. Hold the square firmly in the position now obtained, and slide the fence up the shank and blade until it fits snugly against the jointed edge of the prepared stuff, screw the fence tight on the square, and be sure that the 12″ marks on both the blade and the shank are in exact position over the gauge-line.

I repeat this caution, because the successful completion of the work depends on exactness at this stage.

We are now ready to lay out the pattern. Slide the square to the extreme left, as shown on the dotted lines at *x*, mark with a knife on the outside edges of the square, cutting the gauge-line. Slide the square to the right until the 12″ mark in the shank stands over the knife mark on the gauge-line; mark the right-hand side of the square cutting the gauge-line as before, repeat the process four times, marking the extreme ends to cut off, and we have the length of the brace and the bevels.

Square over, with a try square, at each end from the gauge-line, and we have the toe of the brace. The dotted