



Upsetting With a Hammer

If the bar is short it may be brought to the anvil with a pair of tongs, as shown in Cut (H), and held vertically on the anvil with the hot end up and the heated end hammered, or with the hot end down and the blows struck on top of the cold end. By the second method, the heated end is constantly in contact with the cold face of the anvil, and will therefore cool very rapidly; the result is that the bar will not spread so much on the end, but the bulge will extend up a little farther than by the other method.



Precautions in Upsetting

If in upsetting a bar, it begins to bend after a few blows have been struck, the piece must be straightened at once, for any blows struck endwise on a bent bar will not have much effect in upsetting it, but will only bend the bar more and make the straightening harder. For upsetting, a good heat is required; in fact, it is well to make the final heat a welding heat, because upsetting often separates some of the fibers, and by taking a welding heat over the piece and hammering it on the sides a little, all loose fibers will be welded together again.

MAKING A BOLT Square-Headed Bolt

If a $\frac{1}{2}$ -inch bolt, as shown in Cut (A) is to be made out of a $\frac{1}{2}$ -inch round rod, the end of the rod is heated and upset. When enough metal has been upset to form the head, the enlarged end is re-heated and the cold end of the bar passed through a suitable hole in the swage block, or through the heading tool. If the latter is used, it is laid on the anvil, so that the body of the bolt passes through the hardie hole. The upset end is then hammered down against the swage block or heading tool, as shown in Cut (B) until the head is 9-16th of an inch thick, and the piece driven out of the heading tool. The head is then shaped square with a hand hammer. If, after the sides of the head are properly formed, it is

The Art of Blacksmithing

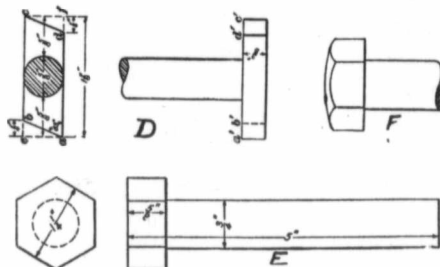
(Continued from January)

found that the head is longer than it should be, it is laid on a piece of soft iron placed on the anvil, and the extra length cut off with the hot cutter. After this, the bolt is put back into the heading tool and the head is finished with the hammer; the bolt is then cut off

to the desired length and the burrs, or rough edges, on the end are hammered down.

Bolt Header

When a large number of bolts are to be made, it is well to use a bolt header, one form of which is shown in Cut (C). The frame is



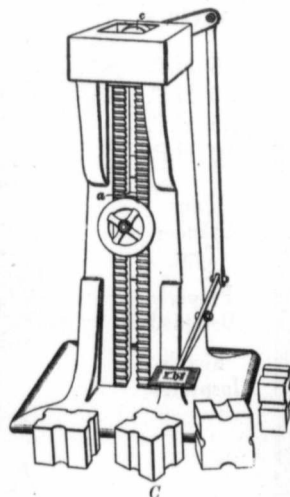
of cast iron and quite heavy; steel dies are provided for bolts of different sizes, usually varying by $\frac{1}{8}$ -inch, although occasionally 7-16th-inch and 9-16th-inch dies are used. The length of the bolt is determined by a steel block (a) provided with notches that engage a series of notches on the

frame of the machine. This block may be set for any length of bolt within its range. The iron may be cut to length so as to leave the right amount of stock to make the head without any trimming. The dies are closed to grip the iron by means of the foot treadle (b) and the head formed with a hammer. The dies fit in the top of the machine at (c), the two dies forming a heading tool.

T-Headed Planer Bolt (Refer to Cut D)

The method of making a T-

headed planer bolt is as follows: Suppose that the bolt is to be made from a $\frac{3}{8}$ -inch round rod, the size and form of the head for the bolt are shown in cut, indicated by the dimensions and letters of the top and side views. The points (a) (b) (c) (d) of the head in the top view correspond to the points (a) (b) (c) (d) in the side view. First the shape of the head is made oblong in cross-section,



tion, as indicated in the top view by the letters (a) (e) (c) (f), and $\frac{3}{8}$ -inch thick.

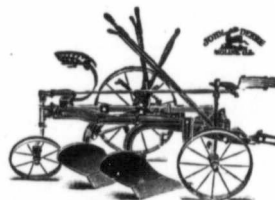
The end of the rod is then heated and upset; but the upsetting is not a continuous operation; it must alternate with hammer work to keep the sides (a) (f) and (e) (c) parallel. For the latter, the bolt is laid flat on the face of the anvil, with first one side (e) (c) placed uppermost to receive the blows of the hammer, and then the opposite side. Also,

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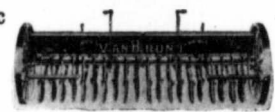
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