

varying from 20 inches to 42 inches. The shorter the stock, the more effectively it transmits the force of the blow. To insure the longer drills working freely in the hole, the width of the bit should be very slightly reduced in each length. Diameter of stock is less than the width of the bit generally by $\frac{1}{4}$ of an inch.

"The smith cuts up the 'borer' steel bars into desired lengths to form the bit, the end of the bar is heated and flattened out by hammering to a width a little greater than the diameter of the hole to be bored. The cutting edge

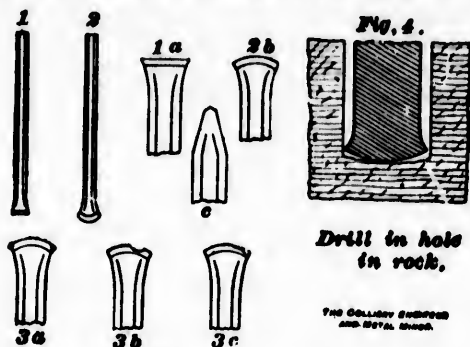


PLATE CXXVI.

Forms of Drills.

is then hammered up with a light hammer to the requisite angle and corners beaten in to give the exact diameter of the bore hole intended. The drills are made in sets and the longer stocks will have a bit slightly narrower than the shorter ones for reasons already given. The edge is touched up with a file. Heavy hammering and high heats should be avoided. The steel should be well covered with coal, in making the heat, and protected from the raw air. Overheated or burned steel is liable to fly, and drills so injured are useless until the burned portion has been cut away. Care is required to form the cutting edge evenly, and of the full form. If the corners get hammered as in Fig. 3a, Plate CXXVI, they are said to be 'nipped' and the tool will not free itself in cutting. When a depression of the