which it is designed to perform. In the example we Plates XXVII., XXVIII., and XXIX., the principal have selected the tool is carried by the slide-rest, and the dimension lines are shown, but the dimensions are omitted. material to be operated upon is made to rotate; however, In fig. 194, Plate XXVII., the dimension lines are not for some purposes this order is reversed, the material being carried or supported by the slide-rest, or by another shown in the drawing dide. The different motions which can be given to the tool when it is carried by the slide-rest will be stated slide-rest which are made by the smith; such drawings further on.

In Plates XXVII., XXVIII. is shown in elevations and plans the slide-rest mentioned in Art. 106. Fig. 193, Plate XXVII., is a plan, and fig. 194 is a sectional front-elevation or longitudinal section. Fig. 195, Plate VIII., is an end-elevation, taken in the direction Y. fig. 194; fig. 196 is a plan of part of the bottom piece D; fig. 197 is a sectional end-elevation or cross-section. The slide rest is attached to a compound slide, of which A is the top of the top slide; by means of this compound slide the slide-rest, as a whole, can be moved in two or otherwise, those pieces which are to be finished, as, directions in the same plane, one parallel to the axis or finished all over, or bright; those not so marked being centre line CC of the machine, and the other at right left in the black, that is, as they leave the smith. angles to it.

The slide-rest proper consists of three movable pieces D, G, and N; the bottom slide G can be moved backwards and forwards along the slide A at right angles to the axis CC; it is fixed in any required position by the bolts B, B. In the top part of D there is a circular T-headed slot or groove E, in which are placed bolts F, F. The bottom portion H of the slide G is circular, and is in contact with the slide D, the two surfaces being similar, except that D has a circular groove, and H has two bolt holes; the two slides are connected by the bolts F, F. In the common vertical centre KK of the slides is fixed a pin or pivot R, round which the slide G can be turned; when the required position is determined, the two slides **D** and G are firmly connected by the bolts F, F. In the top Portion of the slide G there is a screw Ll, which can be turned round in its bearings, but is prevented from moving lengthwise, in the direction of its axis; attached to the screw is a nut M.

N is the top slide or tool rest which slides upon G; the two slides G and N are connected by means of the inclined surface O and the strip P; the nut M is fixed to the slide N, and the motion of N is obtained by turning the screw Ll. Attached to the slide N are four holts and nuts, the former are marked Q; S, S are clamps by means of which, together with the bolts Q, the tool or cutter is fixed to the rest N. The strip arrangement is similar to that given in Art. 31, page 30; the angle which the interview of the strip arrangement of the strip arrangement is the inclined surface makes with the horizontal plane varies between 50° and 60°, according to different makers. The screw Ll has a circular collar T, which fits into a re-Cease in the slide G; outside the collar is a plate U, through which passes the end *l* of the screw; a portion of the the end l is of a square cross-section, and upon this is placed a handle or lever when the screw is to be turned The collar of the screw and the plate are in contact; the latter is attached to the slide by means of two set-screws V, V, and thus the screw is prevented from hoving lengthwise.

The dotted lines aa'b', cc'd', fig. 194, Plate XXVII. thow the extreme positions of the top slide N; it is adus extreme positions of the extreme positions of hoving pieces, so as to see at a glance whether or not the hoving piece can occupy the positions which it is intended it should.

In addition to the scale of the drawing being given, the dimensions, of at least the principal parts, should be marked upon the drawings, even in the case of full-size drawings. In Plate XXV. the dimensions are given; in

shown, on account of the colouring, but they should be

108. In Plate XXIX, are shown the pieces of the are called Forge drawings, drawings of Forge work or Smith work. Forge drawings are generally made full-size, except in the case of very large pieces, and have all the dimensions added; not only those which the smith requires, but also those necessary to finish the article, as the forge drawings pass into other hands besides the smith's. The dimensions put on forge drawings are finished dimensions, so that the smith must make allowance for the material which has to be cut away in the different operations each piece has to undergo. It is usual to mark, in writing

In Plate XXIX. are shown two ways of marking the pieces, and the quantity of each piece required. In the case of screws, worms, &c., the pitch or number of threads per inch, the hand, right or left, and whether single thread or otherwise, are marked upon the drawings; sometimes the threads are drawn by one of the approximate methods given in figs. 96 and 98, Plate VIII. There are many other notes to be made upon the drav ings which depend upon circumstances, but as these vary considerably, we can only indicate the more general case:

In Plate XXIX. are shown the following figures :--Figs. 198, 199, are front and end-elevation of the screw LI for the slide G. Figs. 200, 201, are front and endelevation of one of the screws Q for the tool clamps S, S. Figs. 202, 203, are front and end-elevation of one of the nuts for the screws Q. Figs. 204, 205, are front and end-elevation of the pin or pivot R. Figs. 206, 207, are plan and front-elevation of one of the clamps S for holding down the tool or cutter. Figs. 208, 209, are front elevation and plan of the plate U for holding the screw Ll in position.

The set-screws and bolts, except the bolts or screws Q, are not shown in this example; they are, however, generally put on the forge drawings, whether they are made by the smith who makes the other parts or not.

109. We shall consider it unnecessary to enter into a description of the drawing of the figures in Plates XXVII., XXVIII., and XXIX.; however, we will explain more fully the sections, figs. 194 and 197. Fig. 194, Plate XXVII., is a longitudinal section, as made by a plane passing through the centre of the screw Ll, fig. 193; one of the clamps S is also in section; the cylindrical parts, as the screws Ll, Q, Q, and the pin R, are not shown in section. Fig. 197, Plate XXVIII., is a cross-section, as made by the three planes S.P., S.P., and  $S_{\mu}P_{\mu}$ , fig. 193, Plate XXVII.; we have only shown such portions of the sections, made by these planes, as will explain more fully the connection between the several pieces, which is, in fact, the object of making such sections.

The figures on Plates XXVII., XXVIII., are drawn to a scale of  $\frac{1}{4}$ ; those on Plate XXIX. to a scale of  $\frac{1}{2}$ .

110. Colouring of Working Drawings. - In the examples given in this book, except fig. 194, Plate XXVII., we have employed diagonal lines to distinguish sections from other surfaces (see foot-note to page 23); these lines convey no idea of the kind of material of which the several parts are made; but by employing