38. The V-threaded screw is represented on Plate VI., figs. 83 and 84. It is usual to denote the pitch, which varies according to the diameter of the screw, by so many threads per inch in length; in the example shown the screw is $2\frac{1}{4}$" diameter, and has 4 threads per inch, equivalent to $\frac{1}{4}$" pitch. In fig. 84 *ab* is the pitch, which is set off along the centre line, or upon the outline of the cylinder, as shown at 4, 4, *a*, *b*; having thus divided the screw for the pitch, draw *aa'*, *ab'*, so that *a'ab'* contains an angle of 55°, *aa'*, *ab'* being equally inclined to the axis; from *b* draw *bb'* parallel to *aa'* meeting *ab'* in *b'*; *b'* is the bottom of the groove; draw *b'*4' parallel to the axis, meeting the centre line of fig. 83 in 4'; with C4' as a radius, describe the semicircle 4'2'0', which will represent the bottom of the groove or thread.

The curves 4*b*, 4*a*, *aa*, *bb*, &c., which form the tops of the threads, and *a'a'*, *b'b'*, &c., which form the bottoms of the threads, are obtained in the same manner as described for the previous figures. The groove *ab'b*, fig. 84, is termed the *space*, and is occupied by a projecting thread in the nut. In this example we have divided the semi-circles which form half the end-elevation into 4 equal parts, and, therefore, the pitch into 8 equal parts. As each curve in making a revolution passes through a space *ab*, half the curve, as seen in fig. 84, will have passed through the space *cb*, or $\frac{1}{2}ab$, numbered 1, 2, 3, 4. Fig. 85 shows an enlarged section of the thread. In drawing the V we may either draw *aa'* inclined to the axis at $62\frac{1}{2}°$ ($90°—\frac{55°}{2}$) by setting off the angle by means of a *protractor* from a horizontal line, as the axis, or by placing the protractor at *a*, perpendicular to the axis, and marking off a line *aa'* inclined to *ae* at $27\frac{1}{2}°$ ($\frac{1}{2}$ of 55°), *ab'* being drawn in a similar manner. Having determined the curves for the top and bottom of the thread, as shown by the dotted lines on the left-hand of fig. 84, the remaining curves may be drawn by means of *templates*, consisting of thin wood or card-board cut to the required form. The templates for the curves *a'a'*, *aa*, &c., fig. 84, are shown in figs. 84*a*, 84*b*. It is much better to make separate templates for the different curves, than to try and make use of the ordinary *moulds* or *curves*. The thread we have described is the "*Whitworth Screw Thread.*"*

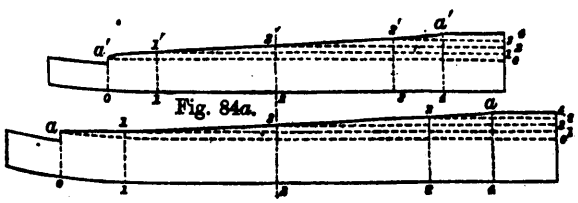

Fig. 84a.

Fig. 84b.

In fig. 84 we have shown the thread of the screw with angular top and bottom; this, however, is not quite correct, but for convenience in drawing we may assume it to be so. The Whitworth screw thread has $\frac{1}{6}$ of the depth rounded off at the top and bottom, as shown in fig. 85.

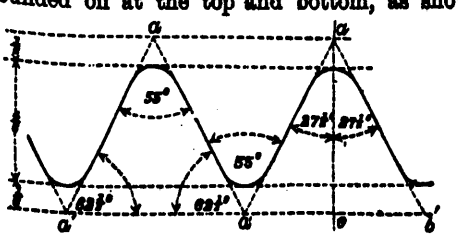

Fig. 85.

* Introduced by Mr. Joseph Whitworth of Manchester, now Sir Joseph Whitworth, Bart.

39. The following table contains a list of the number of threads per inch in length for screws from $\frac{1}{16}$" to 6" diameter, according to the *Whitworth Standard*: —

TABLE II.

Dia. of Screw.	No. of Threads per in.	Dia. of Screw.	No. of Threads per in.	Dia. of Screw.	No. of Threads per in.	Dia. of Screw.	No. of Threads per in.
$\frac{1}{16}$	60	$\frac{5}{8}$	11	$1\frac{3}{4}$	5	$3\frac{1}{2}$	$3\frac{1}{4}$
$\frac{3}{32}$	48	$\frac{11}{16}$	11	$1\frac{7}{8}$	$4\frac{1}{2}$	$3\frac{3}{4}$	3
$\frac{1}{8}$	40	$\frac{3}{4}$	10	2	$4\frac{1}{2}$	4	3
$\frac{5}{32}$	32	$\frac{13}{16}$	10	$2\frac{1}{8}$	$4\frac{1}{2}$	$4\frac{1}{4}$	$2\frac{7}{8}$
$\frac{3}{16}$	24	$\frac{7}{8}$	9	$2\frac{1}{4}$	4	$4\frac{1}{2}$	$2\frac{7}{8}$
$\frac{7}{32}$	24	$\frac{15}{16}$	9	$2\frac{3}{8}$	4	$4\frac{3}{4}$	$2\frac{3}{4}$
$\frac{1}{4}$	20	1	8	$2\frac{1}{2}$	4	5	$2\frac{3}{4}$
$\frac{5}{16}$	18	$1\frac{1}{8}$	7	$2\frac{5}{8}$	4	$5\frac{1}{4}$	$2\frac{5}{8}$
$\frac{3}{8}$	16	$1\frac{1}{4}$	7	$2\frac{3}{4}$	$3\frac{1}{2}$	$5\frac{1}{2}$	$2\frac{5}{8}$
$\frac{7}{16}$	14	$1\frac{3}{8}$	6	$2\frac{7}{8}$	$3\frac{1}{2}$	$5\frac{3}{4}$	$2\frac{1}{2}$
$\frac{1}{2}$	12	$1\frac{1}{2}$	6	3	$3\frac{1}{2}$	6	$2\frac{1}{2}$
$\frac{9}{16}$	12	$1\frac{5}{8}$	5	$3\frac{1}{4}$	$3\frac{1}{4}$		

40. **Square-Threaded Screws.**—Plate VII., figs. 86, 87 represent a right-handed square-threaded screw $2\frac{1}{2}$" diameter, and having two threads per inch, or $\frac{1}{2}$" pitch. A section of the thread of the screw made by a plane passing through SP, fig. 86, is a square whose side = $\frac{1}{4}$ the pitch, the space being a square of equal side. The thread and space, therefore, make up the pitch; but this refers only to *single-threaded screws*. We shall refer to this point shortly. The curves for the elevation of the screw, fig. 87, are projected in a manner similar to that of the preceding examples, as shown by the construction lines; the only difference is in the form of the thread, there being two parallel curves for the top and two for the bottom of the thread in square-threaded screws. At *ef*, fig. 87, the back half of the thread is shown in dotted lines, portions of which, *fg*, *eh*, are in full where they cross the space. It will be noticed the dotted curves are inclined in the opposite direction to those shown in full.

41. As previously stated, Art. 28, page 29, the bearings of screws are *nuts* which fit the former accurately. Figs. 88, 89, represent in half-plan and sectional elevation a nut for the screw shown in figs. 86, 87. The curves are exactly similar to those of the screw, and in the half shown in fig. 89, they are inclined in the same direction as the dotted curves *ef*, fig. 87; in the half of the nut removed they are in the opposite direction.

The construction lines show how fig. 89 is drawn. Fig. 90 is a section of the threads of the screw and nut, showing them in contact.

42. In figs. 83, 84, and 86, 87, we have shown how to draw the true form of the threads of screws, V and square-threaded; however, in most instances, approximations to the true form are employed, and, generally, the smaller the scale of the drawing the further the approximations are carried. Figs. 91, 92, Plate VIII., represent the V-threaded screw shown in figs. 83, 84, drawn to a scale of $\frac{1}{2}$; the curved lines *aa*, *a'a'* are here replaced by straight lines. Fig. 94 is drawn to a scale of $\frac{1}{4}$, the Vs not being shown. In smaller scale drawings lines are used to represent the tops of the threads only, as at *e*, *d*, fig. 70. Figs. 95, 96 represent a *right-handed double square-threaded screw*, $2\frac{1}{2}$" diameter, 1" pitch, scale $\frac{1}{2}$. The curved lines are replaced by straight ones. As there are two independent threads on this screw, the sections of the thread and space will be squares whose sides = $\frac{1}{4}$ the pitch. If there were three threads on the screw, then the squares would have sides of $\frac{1}{6}$ the pitch.

(*To be continued.*)