ORNAMENTAL LATHE SCREWS.

THE obsolete and inconvenient character of the screws that still survive in our costly ornamental lathe apparatus has recently been brought before the public by Dr. Edmunds, an eminent physician, himself much attached to ornamental turning, microscopy, and other scientific pursuits. Twenty-six letters upon these screws have appeared in the columns of the *English Mechanic* (Jan. 20th to May 5th, 1881)—the writers being Dr. Edmunds, Mr. John Jacob Holtzapffel, Mr. J. H. Evans, members of the Amateur Mechanical Society, and others. In the course of this very able and valuable correspondence, Dr. Edmunds elicited from Mr. Holtzapffel all the *data* which had remained unpublished of the "Holtzapffel," or "ornamental lathe screws," and, in closing the correspondence, Dr. Edmunds gave a carefully prepared table, showing all the definable *data* of the "Holtzapffel" screws, and comparing them with other standards. Starting from the numerical denotements by which Charles Holtzapffel strung these comb screw-tools together, Dr. Edmunds shows how these numbers correspond to the screw-mandrel guides, to the alphabet denotements used for the Holtzapffel taps and dies, and to the mandrel noses. He then appends other columns, showing for comparison on each line the nearest element of the English and American standard threads, and also such aliquot pitches as might be substituted in the event of the English standard screws not being adopted for scientific purposes.

Now that these screws are thus exhibited, they are seen to be a mere relic of rule-of-thumb mechanics which have been kept alive for trade purposes, as if the screw-cutting lathe had never been invented. No one will be fatuous enough knowingly to prefer a screw 39·83 threads to the inch when he can have one of 40; 36·10 in place of 36; 19·89 in place of 20; 13·09 in place of 12 or 14; or a mandrel nose of 9·45 to the inch when he can have one of 10. Even the ornamental slide-rest screws used to be cut 13·09 to the inch, but, as amateurs would not stand this, they have long been made 10 threads to the inch. The back poppet cylinder, however, is still screwed 13·09 to the inch, and, therefore, in boring with the D bit by screwing up the back centre, one has to stop and divide an inch by 13·09, and then multiply the result by the number of revolutions that have been given to the back poppet screw in order to get at the depth which the drill has entered. Otherwise the lathe must be stopped, and the hole itself actually measured. In the beautiful ornamental lathes, made by Kennan, of Dublin, the English standard screws were long since adopted, with a back poppet screw of ten threads to the inch, so that with a Kennan lathe one has only to write down the number of turns of the back poppet, and the depth bored is expressed in decimals of an inch. Again, in order to screw chucks for the mandrel nose, Holtzapffel actually sells an extra brass wheel of 53 teeth, so as to get a screw of 9·43 to the inch, which then is the nearest his client can get to the 9·44 of his mandrel nose. Now, why should an amateur be burdened with the cost and complication of this otherwise useless 53-teeth wheel, when the simple screwing of the mandrel nose ten to the inch would be so much easier and better? It is clear that if the back poppet screw, the mandrel nose, and the slide-rest screw were all ten threads to the inch much botheration would be saved, and everything would be simplified.

Dr. Edmunds advises also that the ornamental mandrel should be tubular, with the screw at its left end, either bored through or made in the shape of a nut, so as to carry in from the back a ·25 inch wire or slender rod of ivory, without disturbing anything; that it should have a ⅞ inch (·8750) nose screwed with a Whitworth thread of ten to the inch; that, instead of being a traversing mandrel, it should be a double collar mandrel of the best construction, and carry a spiral arm behind the lathe head. Six change wheels would then cut all the aliquot pitches which Dr. Edmunds recommends, and many more, including the 36 thread universal microscope screw. This arrangement would be more enduring, more effective, and much cheaper than the troublesome traversing mandrel, with its screw guides and spiral apparatus to the right of the lathe head, as is still made by Holtzapffel and Co.

At the conversazione of the Amateur Mechanical Society, held at the Suffolk Street Galleries, on December 6th, we noticed that Holtzapffel & Co.'s exhibit still had the mandrel nose screwed 9.45 threads to the inch, and the poppet cyclinder screwed 13·09 to the inch. Mr. Evans, however, exhibited prominent notices to the effect that he had adopted a mandrel nose and back poppet screw of ten threads to the inch, and that henceforth all his pitches would be aliquot parts of the inch, capable of being originated accurately and easily by means of the spiral apparatus or screw lathe. We may therefore congratulate Mr. Evans's clients upon the advance and simplification that is promised them without further delay. At a general meeting of the Amateur Mechanical Society, in May, 1881, the whole question of ornamental lathe threads was referred to the Council of the Society for consideration and report. The Council have already unanimously adopted the principle of aliquot pitches, and are about to come to a conclusion on the question of angle and cross section of thread. We understand that they are pretty well agreed that the thread of the mandrel nose should be suitable for a cast-iron chuck, and this principle may possibly lead to the adoption of the Whitworth thread, which has an angle of 55°, and is rounded off one-sixth at top and one-sixth at bottom. The multiplication of standards is to be deprecated, and the Whitworth thread, when finely executed, has much to recommend it besides the fact of its universal currency amongst scientific mechanical engineers. Dr. Edmunds, however, points out that a thread of 50°, flattened or rounded down at top and bottom, so as to make its altitude exactly equal to the length of its base, would make but a slight departure from one of the present ornamental screw threads, and that this thread—while an admirable sharp thread for fine purposes—would have the unique advantage that its depth would in all cases be exactly equal to its pitch. Thus Dr. Edmunds's thread, when cut ten to the inch, would be one-tenth of an inch deep, and would leave its shaft diminished by two-tenths of an inch in diameter at bottom of thread. So his thread, if cut thirty to the inch, would be one-thirtieth of an inch deep, and would take two-thirtieths off the diameter of the shaft on which it was cut. This would be a great simplification. The mere form of the thread, however, is of much less importance than the principle of *aliquot pitches*, which can always be originated exactly by means of change wheels without the least difficulty. There is no imaginable purpose for which Holtzapffel's incommensurable pitches could be preferable to the aliquot pitches. Aliquot pitches are easily originated, accurately producible, and lend themselves admirably to calculation. Holtzapffel's incommensurable pitches can only be copied mechanically from the old hobs cut by the present Mr. Holtzapffel's grandfather. There is great variation in the screw tools actually sent out under this name by the ornamental lathe makers, and, in case of

accidental breakdown of the apparatus, the greatest inconvenience is experienced unless the owner have in store a complete set of the Holtzapffel screw tools. It must be obvious that scientific amateurs will no longer invest hundreds of pounds in lathe apparatus constructed with obsolete screws, and we trust that makers of ornamental lathes will, on reflection, cordially co-operate with the Council of the Amateur Mechanical Society, so as to settle this question upon a satisfactory basis.

As there are thousands of ornamental lathes in circulation amongst gentlemen amateurs, we take occasion to reproduce in a permanent form for reference Dr. Edmunds' tables of the Holtzapffel screw data, which we take from the *English Mechanic* (No. 892, page 173):—

TABLE OF SCREW THREADS.

Holtzapffel Screw Threads, as now used for Ornamental Lathe Work.						Whitworth Screw Threads (English Standards).			Sellers' Screw Threads (United States Standards).			Aliquot Pitches, suggested for Ornamental Lathe Work.			
Comb Screw Tools Numbered.	Mandrel Guides. Numbered.	Threads per inch. Angle 55° or 60°.	Taps and Dies. Alphabetical Denotements.	Taps and Dies. Diameters outside Thread.	Taps and Dies. Diameters at bottom of Thread.	Diameters outside Thread.	Threads per inch. Angle 55°.	Diameters at bottom of Thread.	Threads per inch. Angle 60°.	Diameters at bottom of Thread.	Width of Flat.	Diameters outside Thread.	Threads per inch.	Mandrel-Guides.	Denotation.
1		6·58	A	1in. = 1·0000	Undefined.	1in. = 1·0000	8	.8399	8	·837	·0156	1in.	8		The comb screw-tools and mandrel-guides to be denoted solely by a number, indicating the number of threads per inch. Taps and dies to be denoted by their number and outside diameter of their screw-thread.
2		8·25	B	$\frac{7}{8}$in. = ·8750		$\frac{15}{16}$in. = ·9375	9	·7952	9			$\frac{15}{16}$in.	9		
2		8·25	7in. nose	$\frac{7}{8}$in. = 1·1250		$\frac{14}{16}$in. = ·8750	9	·7327	9	·731	·0138	$\frac{14}{16}$in.	9		
3	1	9·45	6in. nose	$\frac{13}{16}$in. = ·9375											
3	1	9·45	5in. nose	$\frac{13}{16}$in. = ·8125		$\frac{13}{16}$in. = ·8125	10	·6844	10			$\frac{13}{16}$in.	10	10	
3	1	9·45	C	$\frac{3}{4}$in. = ·7500		$\frac{12}{16}$in. = ·7500	10	·6219	10	·620	·0125	$\frac{12}{16}$in.	10		
4	2	13·09	4in. nose	$\frac{11}{16}$in. = ·6875		$\frac{11}{16}$in. = ·6875	11	·5710	11			$\frac{11}{16}$in.	11		
4	2	13·09	DD	$\frac{5}{8}$in. = ·6250		$\frac{10}{16}$in. = ·6250	11	·5085	11	·507	·0113	$\frac{10}{16}$in.	11		
4	2	13·09	D	·5600		$\frac{9}{16}$in. = ·5625	12	·4557	12	·454	·0104	$\frac{9}{16}$in.	12	12	
4	2	13·09	E	$\frac{1}{2}$in. = ·5000		$\frac{8}{16}$in. = ·5000	12*	·3932	13*	·400	·0096	$\frac{8}{16}$in.	12		
5	3	16·5	F	·4500		$\frac{7}{16}$in. = ·4375	14	·3460	14	·344	·0089	$\frac{7}{16}$in.	14		
6	4	19·89	G	·4100											
6	4	19·89	H	·3600		$\frac{6}{16}$in. = ·3750	16	·2949	16	·294	·0078	$\frac{6}{16}$in.	16	16	
7		22·12													
8	5	25 71	I	·3300		$\frac{5}{16}$in. = ·3125	18	·2413	18	·240	·0074	$\frac{5}{16}$in.	18		
8	5	25·71	J	·2900											
8	5	25 71	K	$\frac{1}{4}$in. = ·2500		$\frac{4}{16}$in. = ·2500	20	·1859	20	·185	·0062	$\frac{4}{16}$in.	20	20	
9		28·88	M	·2100								$\frac{3}{16}$in.	24	24	
10	6	36·10	L	·2400											
10	6	36·10	N	$\frac{1}{5}$in. = ·2000								$\frac{1}{5}$in.	30		
10	6	36·10	P	·1800								$\frac{1}{6}$in.	36	36	
11		39·83	O	·1900								$\frac{2}{16}$in.	40		
11		39·83	Q	·1625											
12		55·11	R	·1500											
12		55·11	S	·1350											
12		55·11	T	·1200								$\frac{1}{8}$in.	50		
12		55·11	U	$\frac{1}{10}$in. = ·1000								$\frac{1}{10}$in.	60		

* In the half-inch screw Whitworth uses twelve threads, as with his 9-16. Sellers uses thirteen threads in the half-inch and twelve n the 9-16. In all other pitches the English and American standards are alike.

AN INEXPENSIVE LATHE.

(For Illustrations, see Lithograph Supplement.)

AN inexpensive lathe is the one great desire of every amateur mechanic whose spare cash is limited. Some time ago a small bench lathe was illustrated in *The Scientific American Supplement*, and this is shown at figs. 1 and 2. The description given explains the construction. A lathe that will do admirably, says the writer, for amateurs, and which may be easily made, is shown in perspective complete at fig. 1, and the headstocks are shown in section enlarged, at fig. 2. We have added figs. 3 and 4, which show more clearly the construction of the mandrel headstock and of the small standards that form a leg and headstock in one piece. Fig. 3 shows the form of the standard, one pattern only being required from which the various castings can be moulded. Two castings are wanted for the mandrel head, one for the poppet which has its lower part removed, and one for the right-hand standard, which is low, as shown in fig. 2.

The lower part of the poppet is made in two pieces, so that they may be clamped tightly together on the bed by means of the bolt that passes through both pieces, and is provided with a nut having a lever handle. The rest support is also made in two parts, clamped together on the head in a similar way.

The patterns may be easily sawed from 1¼in. pine. The holes that receive the round bars may be chambered to receive Babbitt metal, used in making the fit around the bars forming the bed, around the head and tail spindles, and around the shank of the tool rest. The smallest diameter of the holes that receive the round bars should be a little less than that of the bars, so that the several pieces that are placed on the bars may be fitted to hold them in place while the Babbitt metal is poured in.

The dimensions of the lathe are as follows:—Length of roundbars forming bed, 24in.; diameter of bars, 1in.; distance from the upper side of upper bar to the centre of mandrel, 3in.; between bars, ¾in.; between standards that support the mandrel,