

A new simple Indexer for ornamenting oval turned objects

by Johannes Volmer, Chemnitz/Germany

The making of oval bowls and other oval objects is of increasing interest since the Vicmarc Ovalturning Device VOD 300 and Steinert's ovalturning lathe picOval have been presented and since both are available on the market.

As is well known oval turned pieces can be beautified by ornaments. A great master of ornamenting oval pieces was the American Foster Giesmann (1915 – 2001). He has used a special lathe and refined mechanical devices for different ornamenting processes, all designed and made by himself [1] Years ago he sent me the small lidded bowl in figure 1, a nice example of an ornamented oval piece.



Figure 1 Lidded ornamented oval bowl by Foster Giesmann (1915 – 2001), Christmas 1996

In order to obtain equally spaced ornaments along an ellipse the ornamental turner uses special mechanisms. These mechanisms are called Indexers. Using only the ordinary division plate the ornaments along an ellipse would not have equal distances as shown in figure 2a. The indexer guarantees – with an acceptable error – equally spaced ornaments as in figure 2b. A chapter on Indexers is given in my script *Ovalturning* in the internet [2] and recently in the *SOT-Bulletin* [7].

A report on the state of the art of the “Equal Division of the Ellipse” in the beginning nineties was written by my long standing Elliptical Turning friend Bill Newton in Bradford/UK and me and has been published by the SOT/London in 1995 [3]. As supplementation [4] we have written on the theoretical analysis of an indexer the principle of which was proposed by Don Lee, then SOT member. After an exact theoretical analysis of Lee's proposal a first sample of the *Improved Lee Indexer* (ILI) has been calculated and designed by the author. It is a very simple mechanism, its parts are easily to be made of sheet metal, and the division accuracy is very high. The indexer can be applied at the classical oval chuck, at Steinert's ovalturning lathe picOval [5] and Vicmarc's Ovalturning Device VOD300 [6].

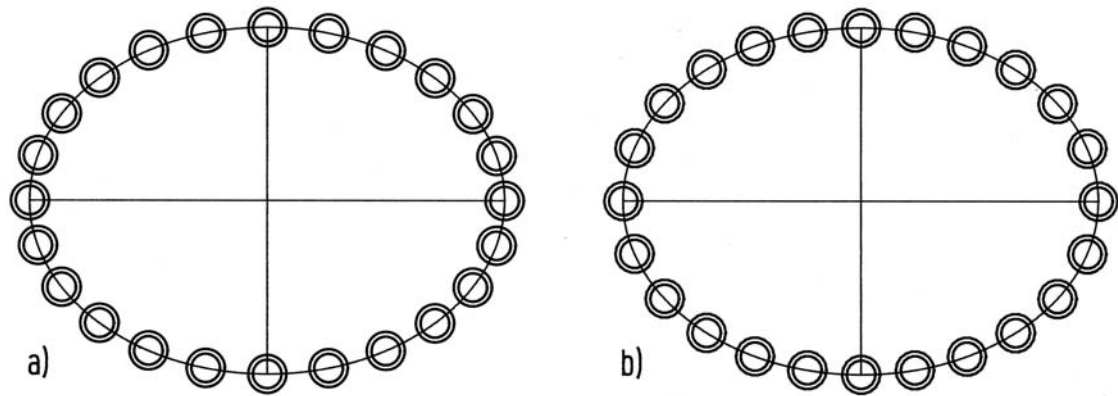


Figure 2 Ornaments along an ellipse

a) unequal distances b) equal distances, achieved by using an indexer

The figures 3 and 4 show the ILI test sample at the author's Ovalturning Lathe ODM30.

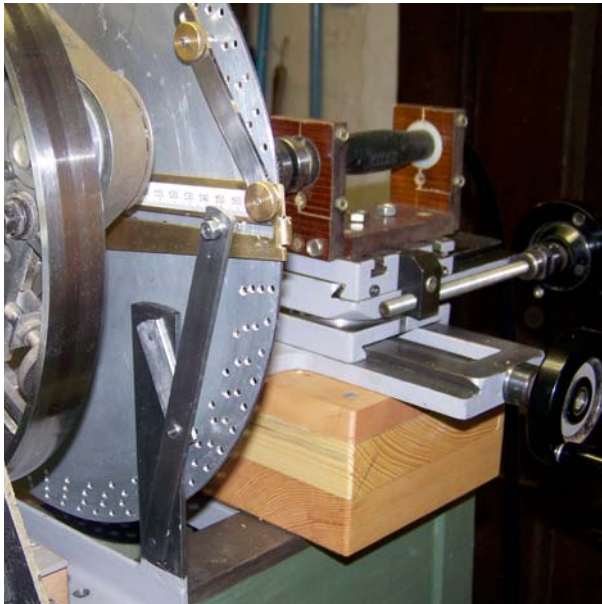


Figure 3 Improved Lee Indexer (ILI) at the Ovalturning Lathe ODM30, rear view



Figure 4 ILI at the ODM30, front view

The ILI test sample has the following details (figure 5). The main and most expensive part is the division plate DP. It has four pitch circles of 72, 60, 56 and 48 holes fitting the index pin IP. Eight holes in the centre of the DP are for screwing it onto the hub of the ellipse mechanism of the ODM30. The brass ring BR rotate around a central steel collar SR, concentric screwed onto the DP, and is screwed together with the 2mm brass arm BA. The arm BA has a 5mm slot SL along which a bolt D can be set. The scale SC gives the distance rD of point D from the midpoint M of the DP. At the arm BA is the index arm IA adjustably fixed by a set screw. The index arm IA is made of thin flat spring steel and has an oblong for the index pin IP. Midpoint D is guided by a mechanism along a straight line parallel to the lathe bed. This straight-line-mechanism consists of the frame bar 1, the lever 2 and the coupler 3. The dimensions of the straight-line-mechanism are the length AB of lever 2 and the lengths AC and AD of the coupler 3. Lever 2 moves around pivot A in frame 1 and has a rotary joint B with coupler 3. Frame 1 has a vertical oblong for bolt C of coupler 3. The frame bar 1 is welded to an angle steel bar AS that is to be fixed on the lathe bed using clamp CL.

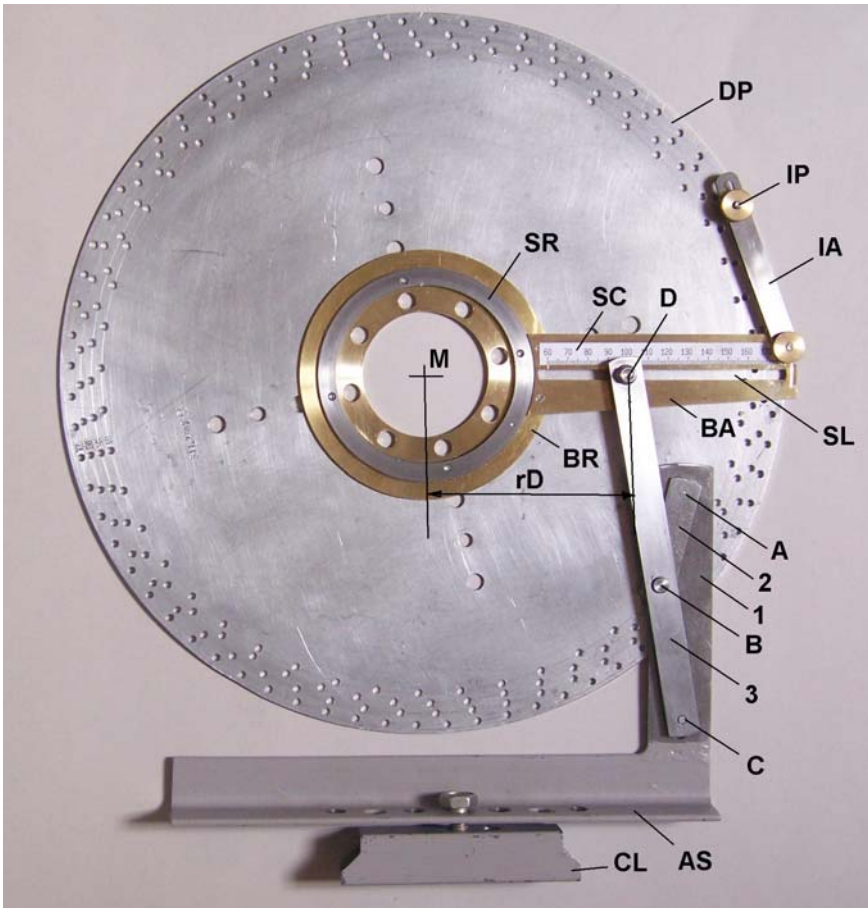


Figure 5 Details of the Improved Lee Indexer (ILI) test sample (Workshop J. Volmer 2007)

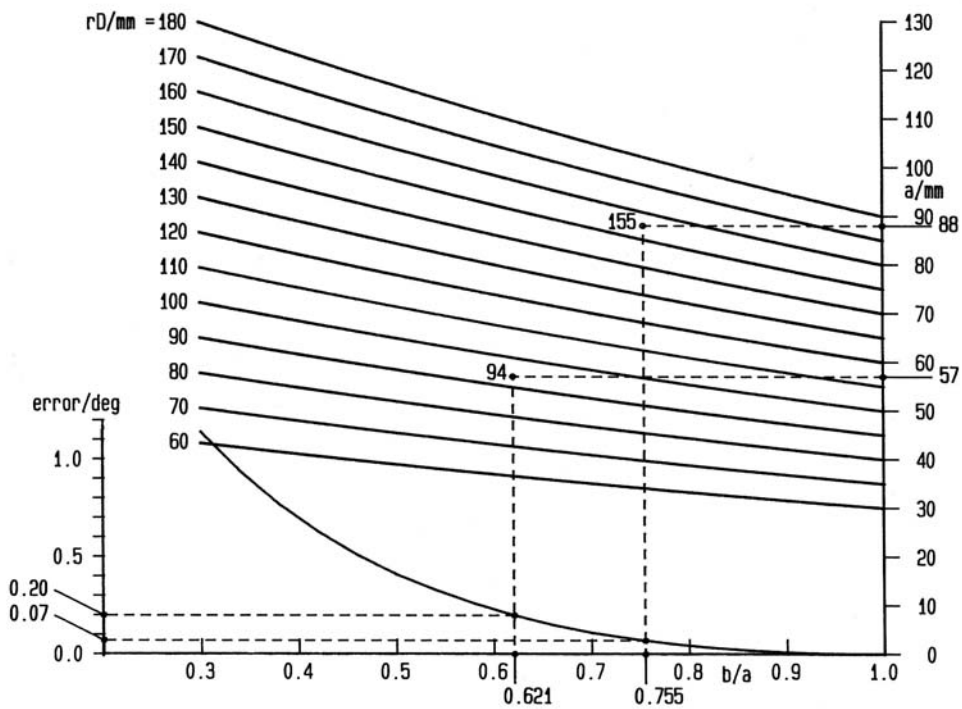


Figure 6 Adjustment-Diagram for the Improved-Lee-Indexer

Examples

Along an ellipse with the major half-axis $a = 88\text{mm}$ and minor half-axis $b = 66,4\text{mm}$ cut 36 circle grooves of 18mm diameter forming a barley corn pattern. The axes ratio of the ellipse is $b/a = 66\text{mm}/88\text{mm} = 0.755$. From the diagram in Figure 6 we obtain for the two values $a = 88\text{mm}$ and $b/a = 0.755$ the radius $rD = 155\text{mm}$. The systematic maximal indexing error is 0.07degree.

Adjust the value of rD at the scale SC (see figure 5). Prepare the workpiece and the router for the barley corn ornamentation. Start cutting the circles in the zero-position in which the major ellipse axis is horizontal. Arrest the ellipse mechanism in this position using the stopper. Loose the set screw of the index pin IP, move the pin in the oblong of the indexarm IA and put it in the nearest hole of the 72 pitch circle. Tighten the set screws. In every index position the ellipse mechanism must be arrested. From one index position to the next go counter clockwise, and after the pin is fixed in the next index position move the workpiece clockwise in order to delete any backlash and arrest the ellipse mechanism using the stopper before cutting the ornament.

The second example is for a smaller and narrower ellipse with major half-axis $a = 57\text{mm}$ and the minor half-axis $= 35.4\text{mm}$, i.e. $b/a = 0.621$. The diagram gives the radius $rD = 94\text{mm}$ and a theoretical error of 0.2degree.

References

- [1] Giesmann, Foster: Ornamental Oval Turning. American Woodturner Vol 9 (1994), Number 3 (September), p. 21 – 24.
- [2] Volmer, J., Ehrlich, G. (Layout) and Springett, David (English Editor): Ovalturning 2006 in www.volmer---ovaldrehen.de/English.html. Free PDF-file
- [3] Newton, E. W., and Volmer, J. : The Equal Division of the Ellipse. London: The Society of Ornamental Turners 1995 (20 pages, 18 figures).
- [4] Newton, E. W., and Volmer, J. : The Equal Division of the Ellipse. Supplementation 1998. Library of The Society of Ornamental Turners London (9 pages, 6 figures).
- [5] Steinert Drechselzentrum Erzgebirge (Woodturning Center Ore Mountains) www.drechselzentrum.de
- [6] Vicmarc Machinery Clontarf/Queensland Australia. www.vicmarc.com/vicmarcCat_07.pdf, p.35 - 38
- [7] Volmer, J.: Ornamenting oval turned objects using indexers. London: The Society of Ornamental Turners. Bulletin 2008 (in preparation)