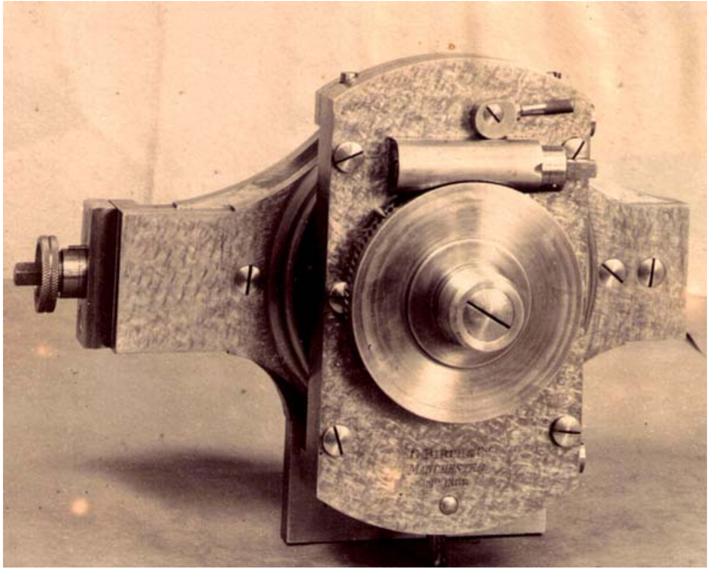
The Ellipse Chuck - thinking about making your own

Q. - - -How large should I make the cam-ring for an Ellipse Chuck. I have heard of them being 3” and sometimes as much as 10” in diameter.

A. - - -The size of the ring dictates the amount of eccentricity you can put on an ellipse chuck. The ring is off-set from the axis of the lathe in order for the ellipse chuck to work. The lathe mandrel passes through the ring to drive the chuck. The late-model Holtzapffel chuck had a cam-ring of 4” outer diameter and a slot for the mandrel of 1½" diameter by 2½” long so the ring could be off-set from the mandrel by up to 1” of eccentricity; i.e. an ellipse may be cut with a maximum difference between the minor and major axes of 2”. So, the answer is - make the ring as large as you can; a ring of 4” outer diameter is adequate but a larger ring can give a greater range of movement.

Another major consideration is stability: the chuck as originally designed has two flat pallets following around the ring so they only touch tangentially and the bearing surface is therefore very small; this can result in instability. Also, if run without any eccentricity the ring rubs on the centres of the pallets and can wear grooves in them. These problems can be avoided by inserting a Sliding Block. Look at the engraving fig.163A on page 136 of Evans's book 'Ornamental Turning'; this is a Sliding Block. The flat sides run inside the pallets and the inner surface runs around the ring; so providing the largest possible bearing surfaces and the minimum shake. Incorporating a steel Sliding Block will add ¼” to the required span of the pallets (the thinnest sections of the sliding block being 1/8”), so for a 4” cam-ring the pallets will need to be set 4¼” apart. Here is a picture of the Evans cam-ring with the steel Sliding Block on it. Top quality Trade Rose Engines have chucks made like this and the diameter of their ring ranges from around 6” to as much as 10”.



George Birch also made an improvement that is well worth considering. Simple Ellipse Chucks have the cam-ring clamped to the sides of the headstock by two pointed screws located in conical holes. If these are over-tightened they could distort the ring and, if not tightened sufficiently they could allow the ring to oscillate. Birch made his cam-ring assembly in two parts: (1) the back-plate, which is screwed firmly onto the face of the headstock and (2) the ring-plate, which is a ring formed on a slide that can be moved horizontally across the back-plate. The slide is adjusted to the required eccentricity by its leadscrew and then is clamped rigidly to the back-plate by two screws: see picture. This improvement, together with the sliding block, gives a chuck with much greater rigidity than that provided by the simple type, and it can be run at more than twice the speed without undue shake. This extra rigidity is most important when cutting with a fixed tool; and its importance for engine turning in metal is evidenced by the quite massive Ellipse Chucks that were supplied with some of the better trade rose engines.

If you wish to make an Ellipse Chuck from scratch, do consider the modern design by Johannes Volmer (www.volmer---ovaldrehen.de/englisch.htm). This chuck uses toothed belt drives and has a built-in counterbalance mechanism which enables it to run much faster than the conventional type.