Q: Could the early turners cut spiral twists on a pole lathe?

A: Yes, if the lathe had a traversing (sliding) mandrel.

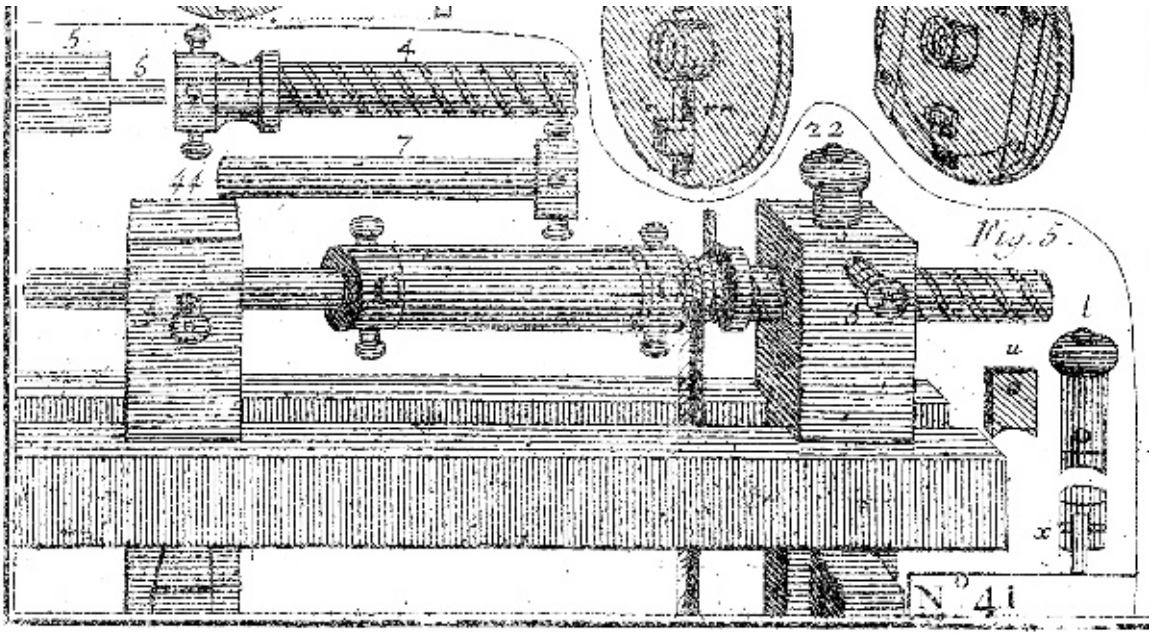
Method 1. Using a Swash Plate and a strong spring.
Mount a cylinder on a Dividing Chuck so you can rotate and fix it in any position relative to the mandrel. Set the swash plate to the helix angle desired for the spiral and rotate it to the minimum swash (for a right-hand spiral, or the maximum swash for a left hand spiral); hold a pencil onto the cylinder to be turned and rotate the mandrel one half turn; this will give the line of spiral. Rotate the cylinder in the Dividing Chuck 180º, return the swash plate to its minimum position and continue the pencil line for the next half rotation of the cylinder. By this means as many pencil lines may be drawn around the cylinder as are required for a single, double, triple, etc., twist. Then repeat the whole exercise cutting out each section with saw, gouge and file. Finish with shark-skin! If this method was indeed used it would have been a very laborious process and I think it quite likely that it soon stimulated the invention of the screw-guide method.

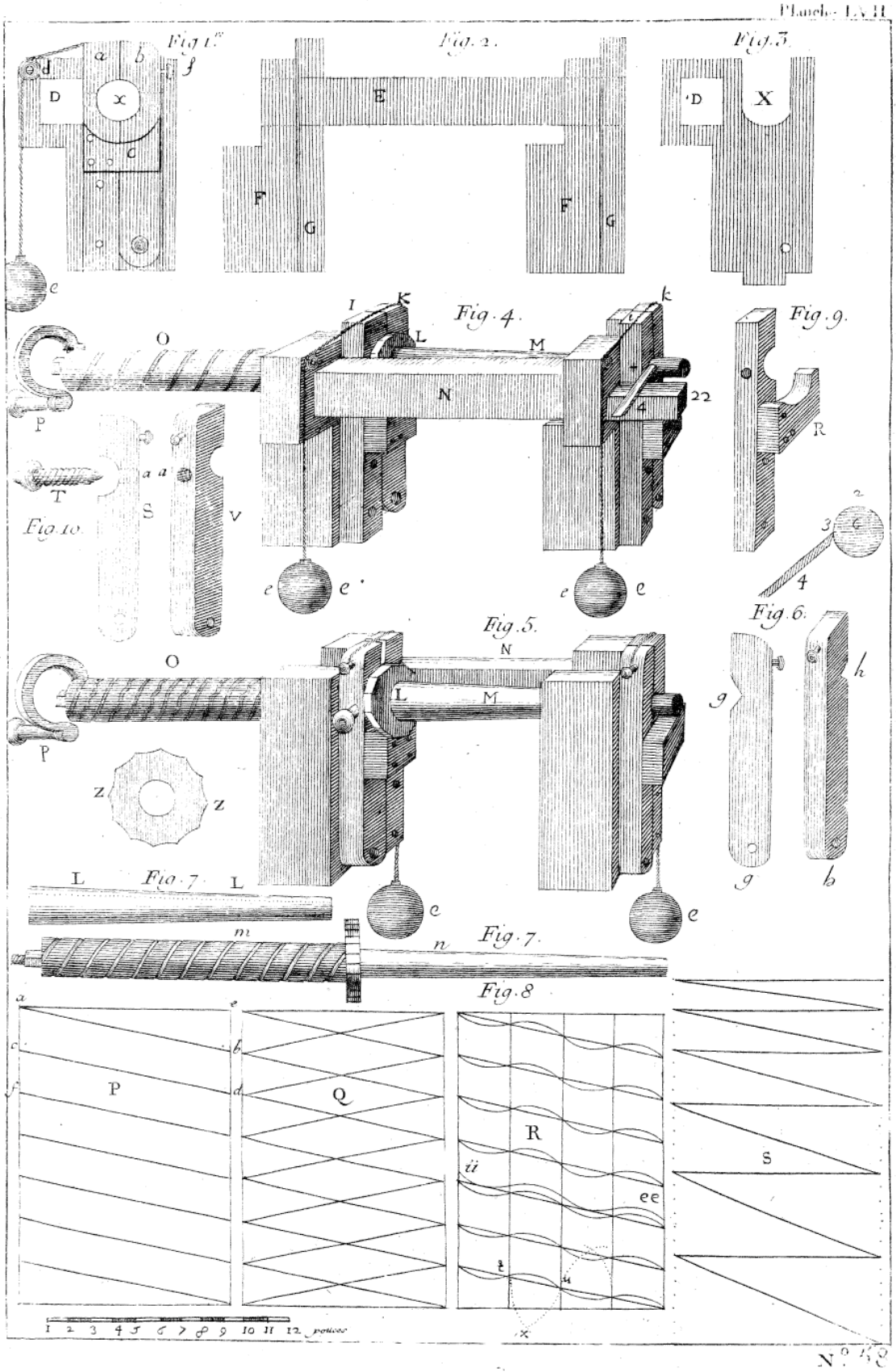
Method 2. Using a Screw Guide.
Plumier surmised that twists may have been inspired by the tendrils of vines winding around tree stems. Plate LXII in his book shows a machine for cutting Spiral Twists; it shows his method for turning, not just simple spirals, but also wavy spirals, ribbed spirals, unequal spirals etc. The machine for simple spirals is shown on Plate XL Fig 5. These illustrations were included in the first edition of Plumier's book published in 1706 and as the more complex machine was known at that time, I feel certain that the simpler machine must have been around some considerable time before 1700.

Plumier's method was to draw lines on a piece of paper 'P' at the desired helix angle; then wrap the paper around the cylinder, glue in place and, when dry, make saw cuts along the lines; enlarge the saw cuts with a three-corner file to sufficient width to accommodate a screw-pin (Plate XLI Fig.10) with a coned end which fits the filed channel. Paper 'Q' is for both left and right hand spirals, paper 'R' is for a 'winding' or 'wavy' spiral, using a small chisel instead of saw and file, and paper 'S' is for a 'progressive pitch' or 'unequal' spiral.

The combinations obtainable on this machine are many and various: for example, by using a template (Plate XLI Fig.7 'Z-Z') the machine can be made to rock thus producing a 'ribbed' (or roseate spiral) and this can be combined with the ‘unequal’ spiral or the ‘winding’ spiral. The diameters of the spiral may be varied by deeper and shallower cutting or by taper-turning. The 'machined' nature of this work could be disguised easily by the fact that hand-tools are used. All this goes to show that a great variety of ornamental turning could have been executed on a pole lathe if the operator had great skill and patience!

Plate XL Fig 5 (below) shows how to cut Simple Spirals. Make two Guide Cylinders '4' and '7'; each must be longer than the workpiece and each must have a hollow end and pinch screws to hold the workpiece cylinder firmly between them. The 'tail' cylinder is plain and traverses inside the hollow tailstock '44'. The 'head' cylinder has a neck to take the rope driven by the Pole; the remaining length is spiral-cut with saw and file as described above and its traverse is controlled by the pin 't' which drops into the hole in the top of the headstock '22' and locates a key 'u' into the groove of '4' at the helix angle of that spiral and is locked in position by screw '3'. The spiral is cut into the workpiece, a short length at a time with a hand-held gouge or chisel.





Here is Plate XLI which shows the machine for complex spirals.