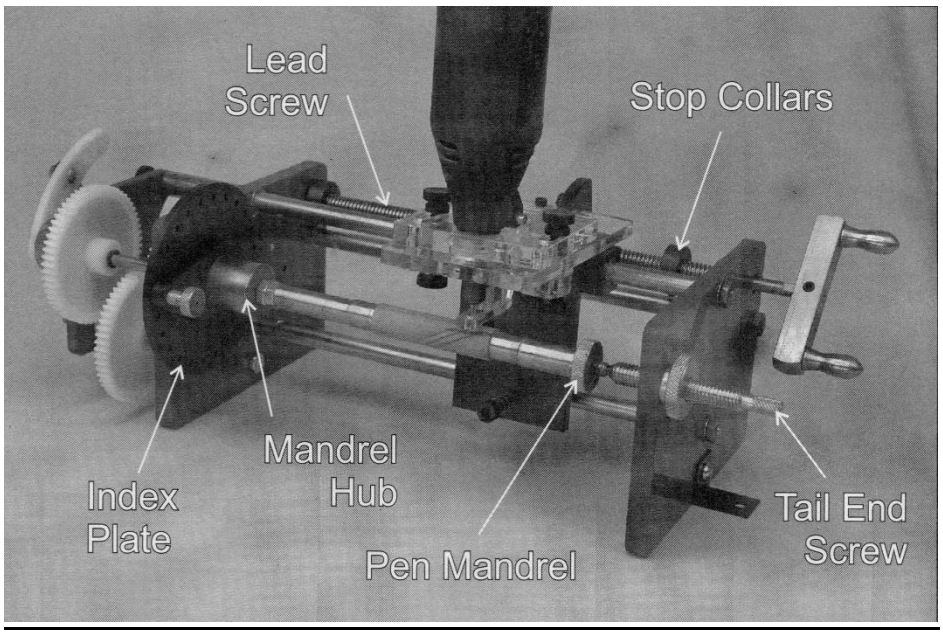
Beall Pen Wizard

By Ian Elliott

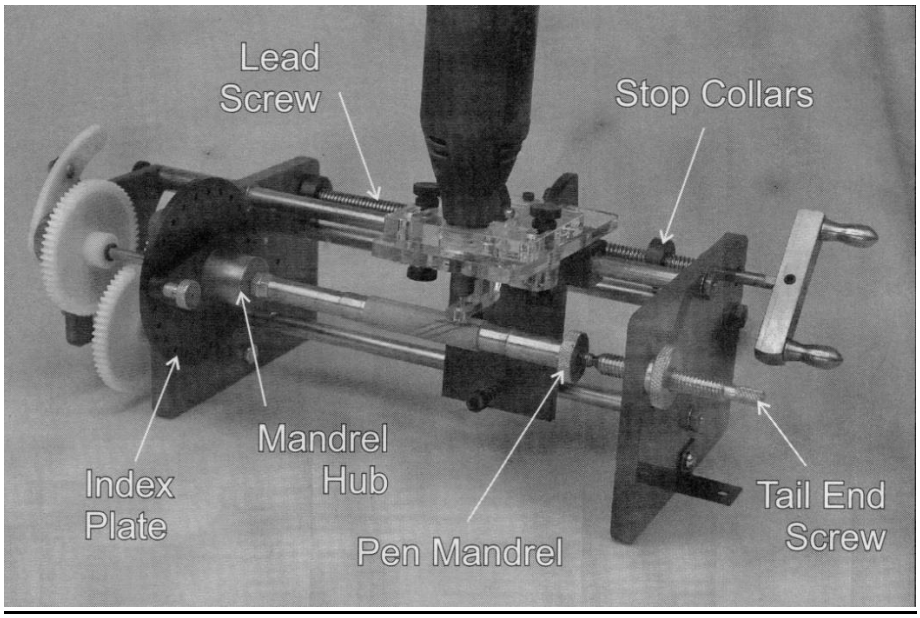
At our auction last December, I purchased a Beall Pen Wizard, I knew what the Pen Wizard was used for before I saw it in the catalogue. Then I did a bit more research and found out that at the time they cost £428.28 new. On the night of the auction I check it out and it looked in reasonably good condition. There was only me and one other interested in bidding, though the other person mustn't have been that interested, as I got it to my surprise after only a couple of bids for £35, I had expected it to go for more than that.



The Pen Wizard is a stand-alone piece of equipment for putting spiral patterns along the length of a pen blank. Using a Dremel to do the cutting.

Later that weekend I did some more research and downloaded the manual, though it was not all that good. For example, everything on mine was on the opposite side to the photographs in the manual. I concluded that mine must be an early model. Hence the opposite handing, I also did not have any additional gear wheels or a depth gauge. There was also an add on attachment for Guilloche patterns (wavy lines rather than spirals see photograph above)
The Toolpost are the UK agents for Beall's so I emailed them asking for a price for the parts I needed to bring mine up to date. After several days they replied saying they did not understand my request and would ask Beall's in the US. That was the last I heard from them. So just after Christmas I emailed Beall's direct, they could supply me with everything at a cost of $52 plus carriage of $55. Order placed and delivered with one week, though I did get another bill from the carrier for £28 duty and brokerage. I finished paying an extra £132 over my £35 purchase price, this was still more than less than half price.

I have told you how I came by my Pen Wizard. Now I am going to try and explain how it works. Please bear with me as it's not the easiest piece of equipment to explain without having it in front of you and the person you trying to explain it too. I have also tried to cover everything, so forgive me if I go on a bit. If you are really interested in understanding how it works you will probably have to read this more than once.
To make it more complicated, as I said last time my model is the opposite hand to the instructions, photographs and diagrams in the manual (the photograph below is from the manual)



The Pen Wizard is a stand-alone piece of equipment for putting spiral patterns along the length of a pen blank. Using a Dremel to do the cutting. The Dremel travels slowly along the pen blank whilst the Pen Mandrel rotates in accordance to your Gear settings.
For the moment I am going to concentrate on how it works to cut spirals on parallel pen blanks, I will later go into curved or tapered pen blanks, polygons both parallel or spiral and Guilloche patterns (wavy lines rather than spirals).

Double Spiral or Crosshatch

Guilloche

The Pen Wizard consists of a Pen Mandrel mounted below the Dremel. The Dremel is mounted at the outer edge of the top of a “T” shaped carrier, (see my diagram 1 and photograph below). The other side of the top of the “T” has a slot that fits into a guide that is mounted on the Lead Screw. In turn this guide traverses along the Lead Screw thus moving the Dremel either to the right or left, depending which direction you turn the handle. There are also two adjustable stop collars (not shown on diagram 1) on the Lead Screw, to determine start and stop points when cutting your spirals. At the bottom of the leg of the “T” is a thumb adjusted screw which rubs on Guide Bar 3 that is parallel to the Lead Screw and Pen Mandrel. By adjusting the thumb screw this cantilever’s the “T” lifting or lowering the Dremel. This determines the depth of cut only when your pen blank is of a parallel shape, a separate demountable Depth Guide, must be attached when your pen blank is either curved or tapered.

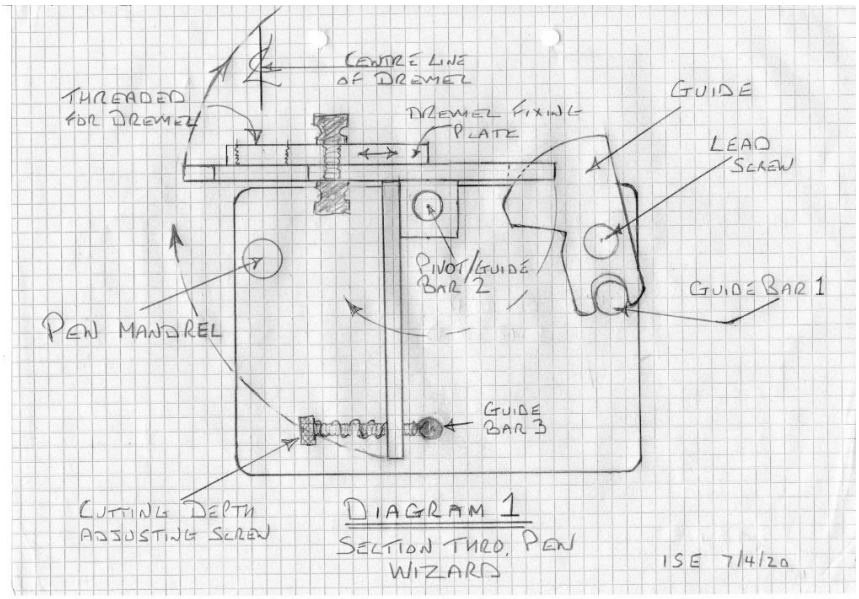


Diagram 1 is of my Pen Wizard which is the opposite hand to the photograph from the manual.

At the other end of the Pen Mandrel is the Indexing Wheel and the Mandrel Hub. Unlike a lathe the Indexing Wheel is a permanent part of the Pen Wizard.

Indexing Wheel

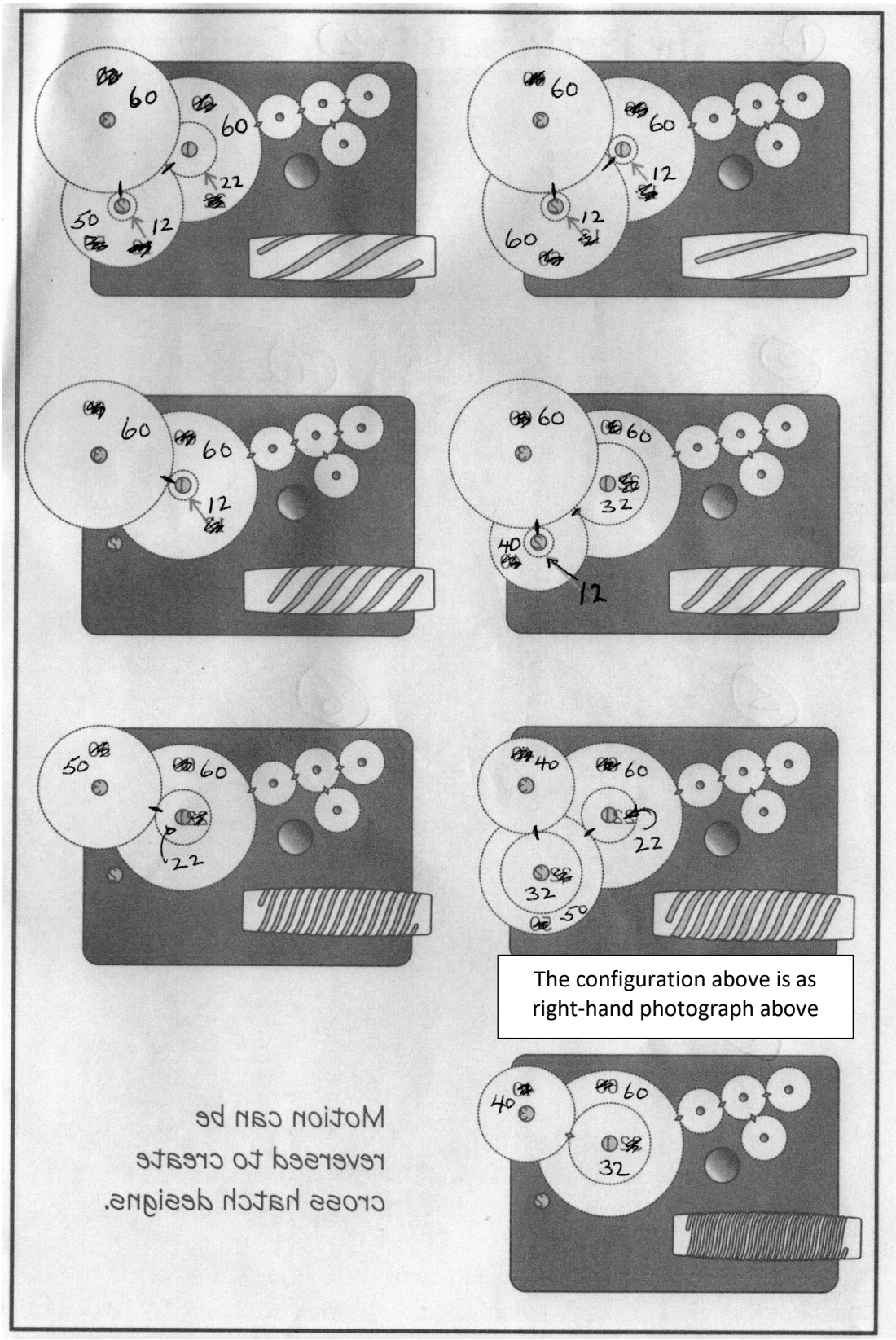
Indexing Wheel & Mandrel Hub

The Indexing Wheel has 24 holes; therefore, you can make any number of passes that are equally divisible by 24: 2,3,4,6,8,12, or 24. You can very easily make mistakes, (I have done this, it completely ruins the blank you were working on. Bin job!) as you are counting between passes, you are also concentrating on the cuts etc. So, I purchased some coloured dots, these I applied to both sides of the wheel, as the ones on the front can be obscured by the hub. Red = 8 passes, Yellow = 6 and Green = 4, I think that these will be the most likely ones I will use. If I need to use any others, I will just have to be more careful with my counting. The Mandrel Hub has a spring-loaded Indexing Pin that you locate into the holes on the Indexing Wheel.

The only difference in the two photographs above is the position of the 4 small (20 teeth) cogs on the far right. These are the only cogs that are permanently fixed to the back plate; these cogs are driven by the Lead Screw they in turn drive all the other cogs. The other larger cogs are all changeable to give you a different pitch (tightness of the spiral). 3 of the 4 small cogs are moved either

up or down by means of a metal thumb screw, which has two possible location holes threaded into the back plate. The Photograph on the right shows them in the up position, when the handle of the Lead Screw is turned to cut along the length of the mandrel, the mandrel will turn clockwise. When they are in the down position (photograph left), the mandrel will turn anticlockwise. By using both settings, is how you achieve the crosshatch effect on a pen blank (see Double spiral pen above)

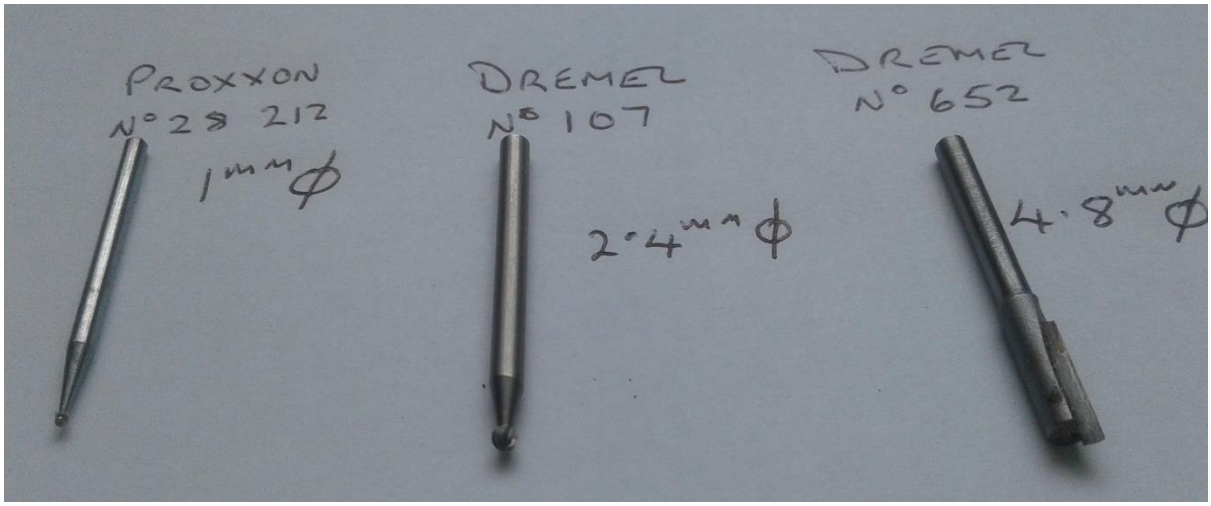
There are three ¼" D shaped shafts that carry the other Gear cogs, the top left one is connected too and drives the Pen Mandrel. These Gear cogs have a D shaped hole matching the shaft. The shafts are all equidistant from each other. This allows you to obtain a wide variety of gear rations, therefore giving you a large variety of effects. Any pair of cogs that teeth interlock must always add up to 72 teeth. The diagram below was scanned as a mirror image from the manual, the numbers I have written on the cogs are the number of teeth on each cog. I have also put different coloured dots on each size of my cogs, so I can easily identify them, as there is only a very small almost unreadable mark on each cog. You will note that the cog nearest the 4 drive cogs is always a 60-tooth cog. For my photographs above I have removed the outer plate to show the cogs.



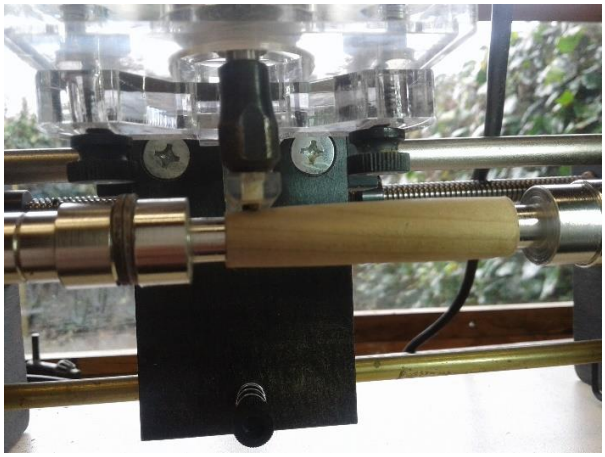
The configuration above is as right-hand photograph above

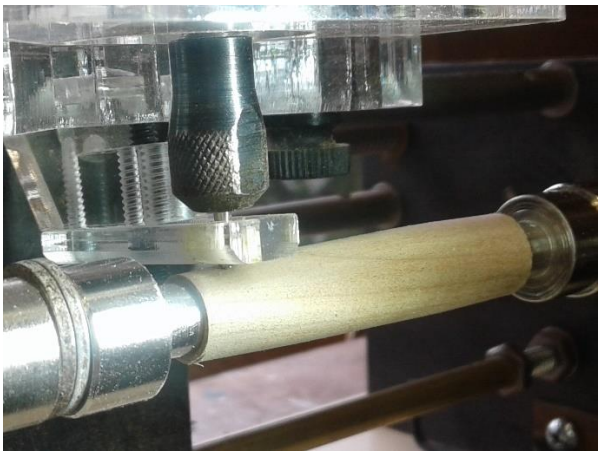
Motion can be reversed to create cross hatch designs.

Now I am going to cover Polygons and Guilloche, but first I need to cover the cutters. When I first got the Pen Wizard, I needed to purchase some new cutters for my Dremel. Axminster had only a small selection of Dremel cutters, but a larger selection of Proxxon cutters, But I was keen to get started, so purchased some Proxxon cutters. These cutters had a longer shank than Dremel cutters, this would not normally be a problem; but with the Pen Wizard you can't adjust the depth correctly as you have a very limited amount of adjustment. So, I had to cut them down to the same length as the Dremel cutters.
The two cutters on the left I have used on spirals and guilloche patterns and the one on the right I used for polygons (single fluted router cutter).



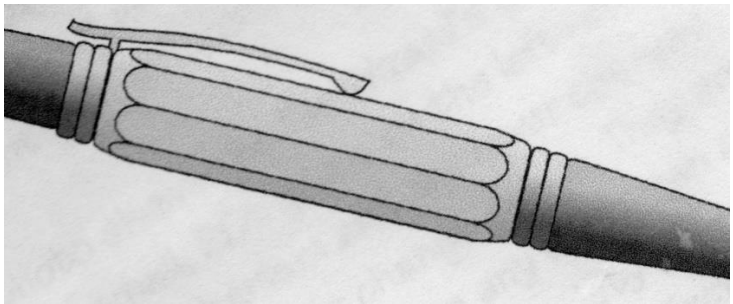
The two photographs below show the cutters over the pen mandrel. They also show the alternative Depth Guide in place, this guide is used on blanks the are curved or tapered. Which I'll cover next time. You will note that the cutter is over the centre of the pen mandrel. This is correct for spiral and guilloche cuts, but for polygons the cutter needs to be against the inside.





There are two types of polygons straight or spiral twist, below are two examples of polygon spiral twist. A Lace wood pen and a Corian razor blank.

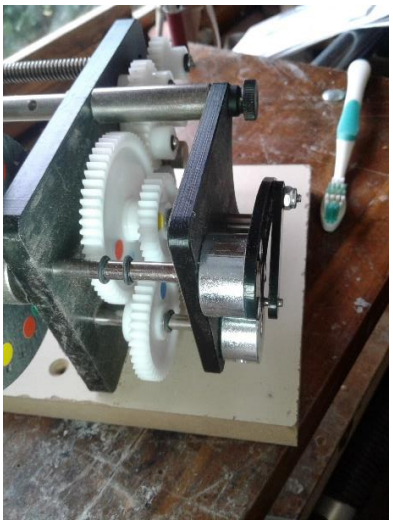
This sketch shows a straight polygon.



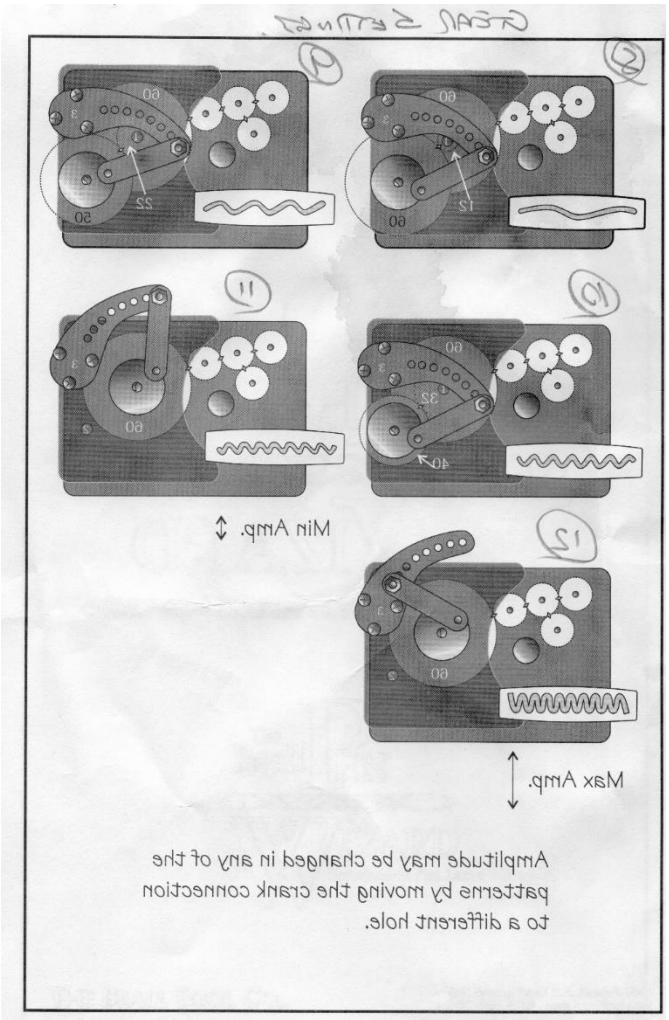
Also, for the straight polygon you must dis-engage the gear cog that attaches to the mandrel. So, when you turn the handle the only thing that moves is the cutter/Dremel along the length of the blank.

The problem I have yet to address with polygons is how to sand, as you can see from the photograph below the cutter marks are quite evident. However, they are not on the Lace wood pen above, it is straight off the cutter! The 12mm dia. bobbin sander for the Dremel only seems to come at 80 grit. I have thought about trying to make my own bobbins using 12mm dowel but have not got around to it yet. Any other ideas????

Now for Guilloche patterns (guilloche is just a fancy
word for a wavy line.
To form a Guilloche the settings are slightly different to spirals. You must dis-engage the gear Cog that attaches to the mandrel, the same as you do for straight polygons. The main body of the Guilloche Attachment is attached to the ¼" D shaped shaft that is attached to the mandrel, this is secured with a grub screw. The other hub can be connected to either of the other two D shaped shafts (this in-conjunction with the gearing and the position of the cranked arm determines frequency of the wavy line). Photographs below are the Guilloche attachment and it fixed in place.



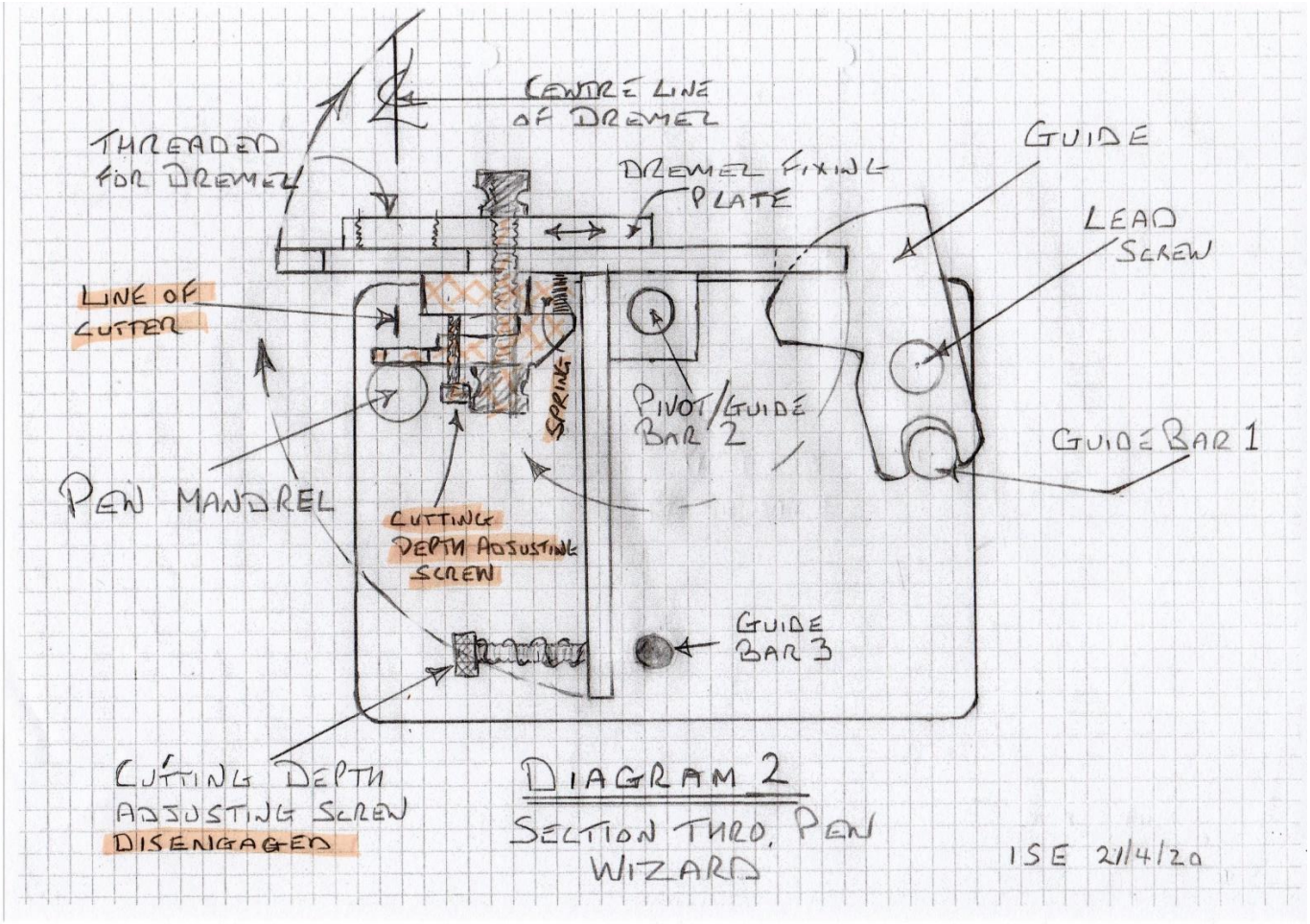
The diagram below was scanned as a mirror image from the manual. Like cutting spirals it depends on the gearing, plus which spindle the second hub is attached too and which hole the cranked arm is located into, defines the frequency of the wavy line. These show only a few of the possibilities, mind you these 5 are probably enough.



Guilloche infilled with Epoxy/Purple heart dust

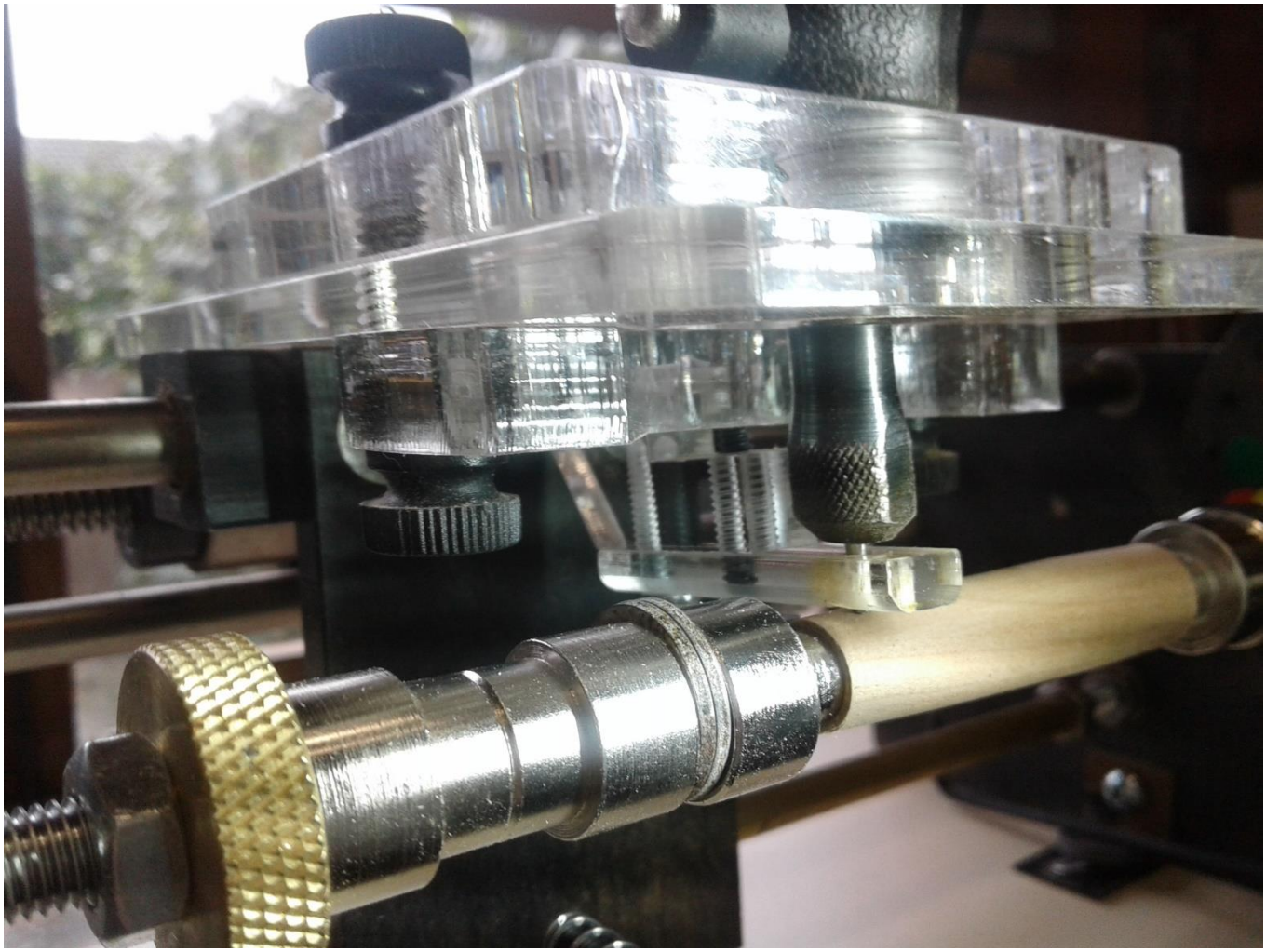
Guilloche no infill colour comes from scorching by cutter.

Earlier I explained how the depth of cut was controlled on a parallel pen blank. There is also an attachment Depth Guide which allows a uniform depth of cut, for curved or tapered pen blanks. This bolts on below the Dremel fixing plate, with the aid of two longer replacement nylon bolts. The original cutting depth adjusting screw is disengaged so that it no longer rubs along guide bar 3. On Diagram 2 below I have highlighted the differences from Diagram 1 (shown in part 2)


CENTRE LINE OF DREMEL
THREADED FOR DREMEL
DREMEL FIXING PLATE
GUIDE
LEAD SCREW
LINE OF CUTTER
SPRING
PIVOT/GUIDE BAR 2
GUIDE BAR 1
PEN MANDREL
CUTTING DEPTH ADJUSTING SCREW
GUIDE BAR 3
CUTTING DEPTH ADJUSTING SCREW DISENGAGED
DIAGRAM 2
SECTION THRO. PEN WIZARD
ISE 21/4/20

Depth Guide

Like a lot of things on the Pen Wizard the attaching of the Depth Guide is very fiddly. The same pair of nylon bolts hold both the Depth Guide and the Dremel fixing plate in place. First you screw the bolts holding the Guide in place, they thread from underneath into the top section of the “T” shaped carrier, protruding through the top of the Dremel fixing plate. Then the nylon nuts screw to the same bolts, this now holds the Dremel fixing plate in position. To set both the Dremel fixing plate and the Depth guide, (which slide back and forth independently of each other) you move them until you locate them in the required place then tightened. You can remove the Pen Mandrel to carry out adjustments and/or final tightening, as this allows the T shaped carrier to swing right back. But when you put the Pen Mandrel back you need to double check that the cutter is in the right position and set to the right depth of cut. As I said fiddly.



You will also see from my first photograph that there is some scorching on my Depth Guide. The Manual says “that the Depth Guide will only work with bits that are 1/8” or less” the aperture that the bit goes through is 4mm. But there is 2 to 3mm of lateral play on this part of my guide and as this is the part that is riding on the pen blank, there must be some resistance, so the shaft of the bit comes in contact with the Perspex, hence the scorching on the Perspex! The Manual also says “but the foot can be replaced with a shop made substitute for larger sizes” I could see even before I read that, that I would have to make a replacement at some point anyway!

You will normally go back to your lathe pen mandrel to finish your pens, after using the Pen Wizard. To sand and apply finishes, also to re-cut if you have filled the cuts with Epoxy/glitter, etc.

I have tended to make batches of blanks before going to the Pen Wizard. You do not want to be doing all the fiddly setting up just for one pen, which may go wrong.

<u>Now for some things that went wrong.</u>

There was some cutter scorching, but like an idiot I used a white infill, which the scorching showed through. My excuse was I had not used that infill before so did not know it was so light thought it was silver. Timber is Sycamore.

This one I got the indexing wrong, again Sycamore.

This one as you can well see far too deep of a cut, even went through the brass tube. The cutter came loose in the Dremel. Bad workman always blames his tools.

This one I was trying a spiral too tight.

This one I did one cut pass on the bottom half but two passes on the top half, which widened the cut. This was not evident till I reshaped it on the lathe after applying the infill (Epoxy/Red Glitter powder)

<u>I did get some right (well I think so)</u>

Polygon spiral Lacewood

Guilloche with Epoxy/Purple Hart dust infill cannot remember what the timber this is.

Double Spiral with Epoxy/Blue Glitter powder infill same timber as above.

Single Spiral with Epoxy/Brass powder infill Sycamore

Double Spiral Epoxy/Bronze powder infill Sycamore

Conclusion

The Beall Pen Wizard is I think as you probably have already concluded a very fiddly piece of kit.

If you are just looking to make some different style Pens from the next turner, that's fine. But If, however you are looking to sell Pens at a profit, look for some other way to make yours different.

As I have only been experimenting with the Pen Wizard so far everything has been a trial, so I have only used cheaper Pen Kits, until I am more confident that I am going to get 100% results every time.

I got my Pen Wizard at less than half the price new and I am enjoying using it and the challenges.

Hope you have found this article on the Pen Wizard interesting and I have not rambled on too much, but I have tried to cover all aspects. It's also given me something else to do during these very trying times.