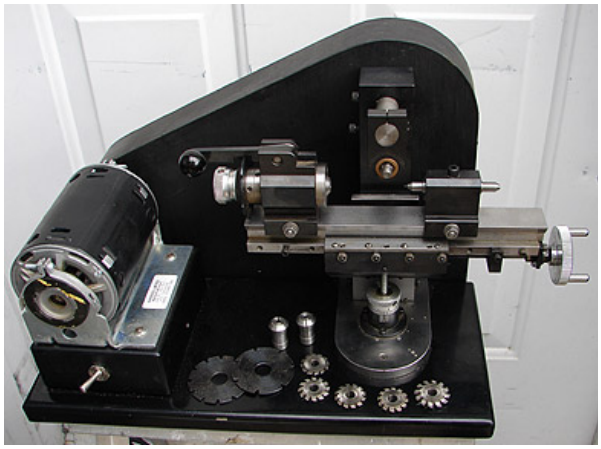
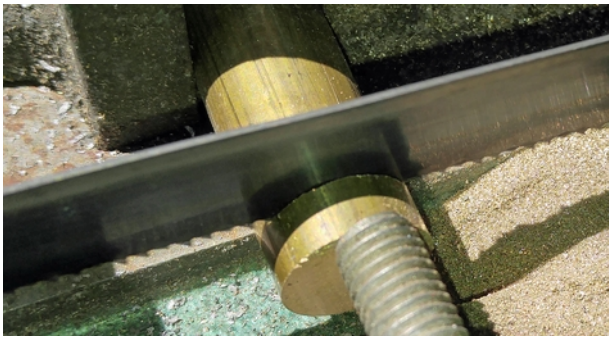
Pinion Cutting on a Chronos Pinion Mill

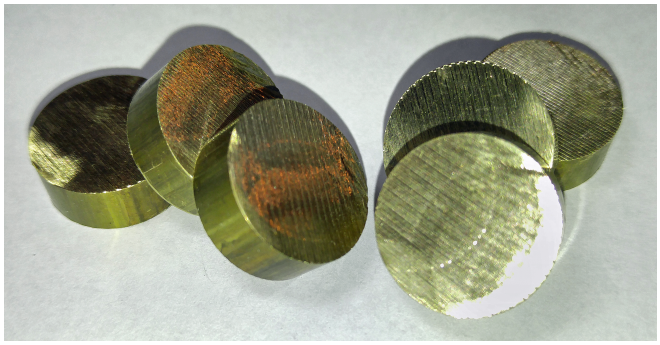


I need to make a number of brass pinions for a spring powered motor that I am designing and making. To save time I will use my Chronos Pinion Mill to gang cut six of these pinions at a time.

The Chronos Pinion Mill is basically a micro horizontal milling machine.

The pinions to be were cut into brass slugs.



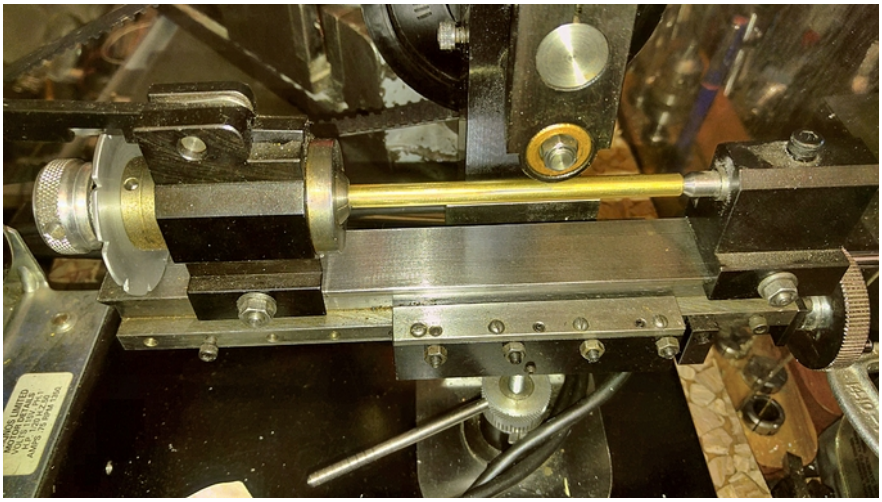


These slugs were surfaced on both sides while held in a customized brass emergency collet.

Next they were center drilled.

And finally, a 1/4” hole was drilled clear through the slugs.

This resulted in six pinion blanks all the same size.

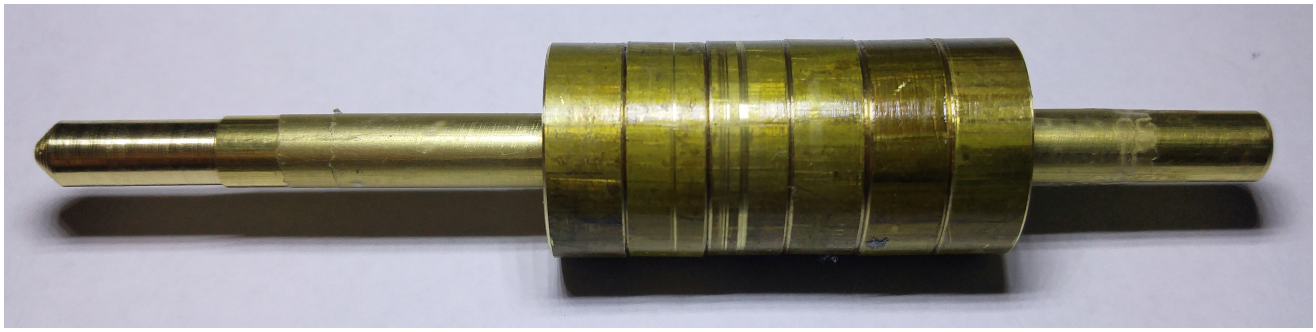


A 1/4” diameter brass rod was prepared to support the pinion blanks while they were being cut.

The left end had to be slightly turned down to fit the odd sized collet in the machine.

The right end was center drilled for mounting on the small dead center.

The six pinion blanks were superglued together and onto the brass support bar to prevent any unwanted movement as all six were being cut.



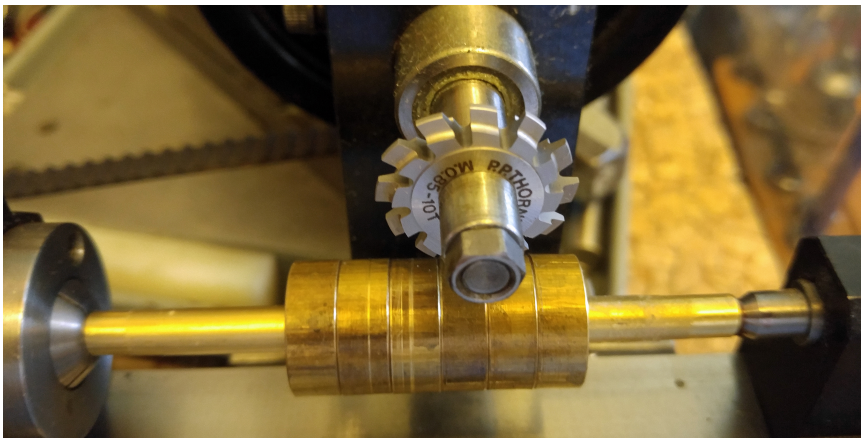
The center drilled end can be seen in these views.

It was important that all of the blanks were glued into one solid block.

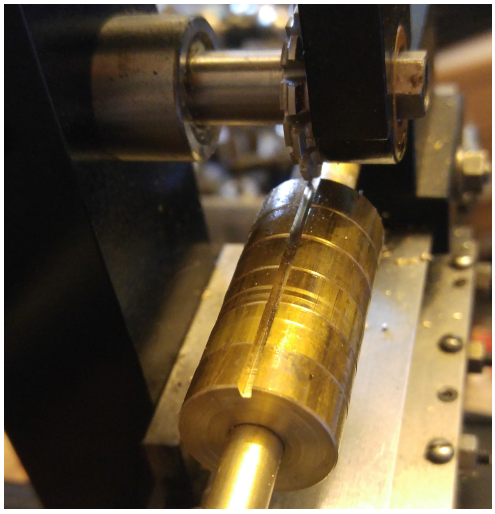
For a clock, steel pinions would be cut but I am making a spring powered motor which might be run 5 minutes at a time and only a few times per month. The pinions should last for at least decades.

Now the fun begins…

This is the cutter I chose to use. It is about 1” in diameter.

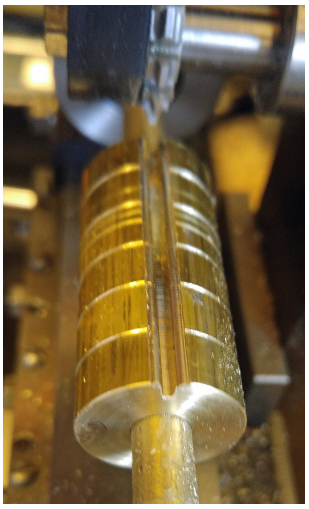


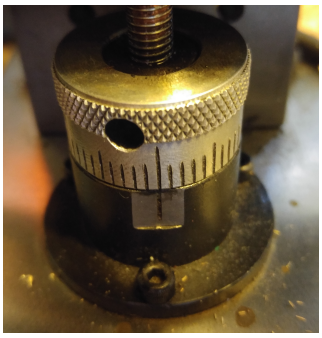
Careful attention to centering the cutter on the support bar axis is critical to avoid producing a “drunken pinion”.

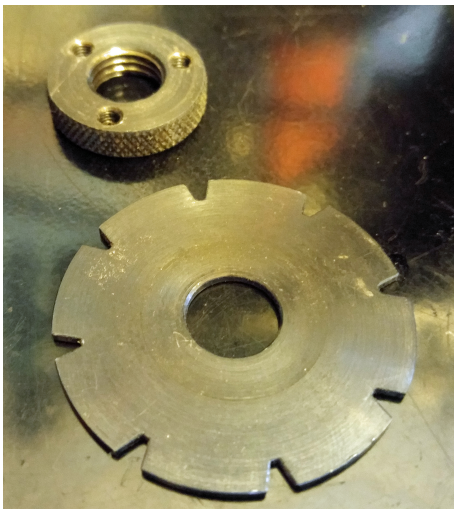


A shallow test cut was made to be certain that everything was lined up perfectly.

Then a deeper cut was made. The depth of cut was controlled by the dial below the mill table.



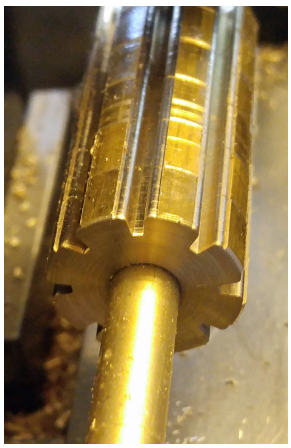


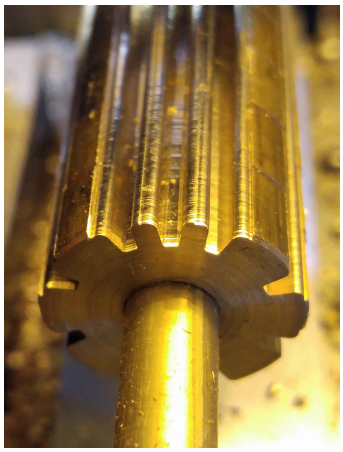


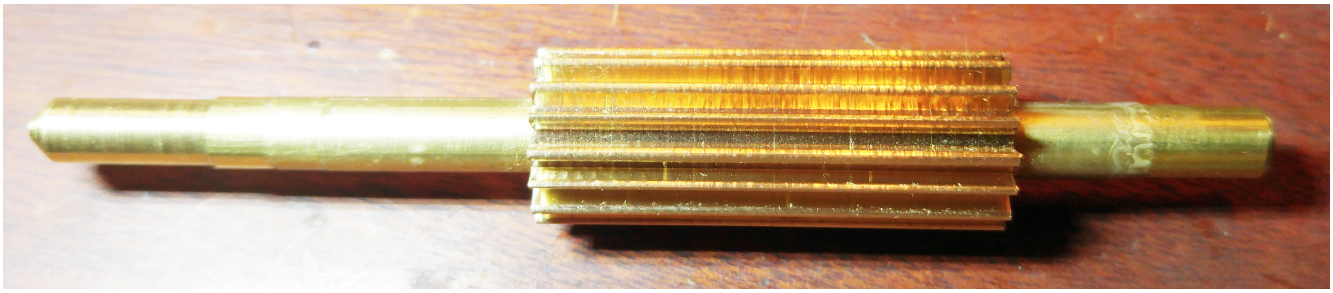
For a clock pinion, I would have made a new index plate with the proper number of notches. For the motor I decided to use an 8 notch index plate. I wanted to cut 16 leaves and had this 8 notch plate. I decided to use it and shift the pinion blanks to cut the second 8 cuts.

Shown here are the original 8 cuts.

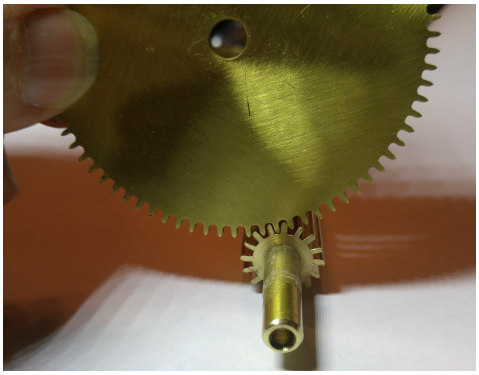
On the right is shown cutting between the 8 cuts to make the final 8 cuts for a total of 16.







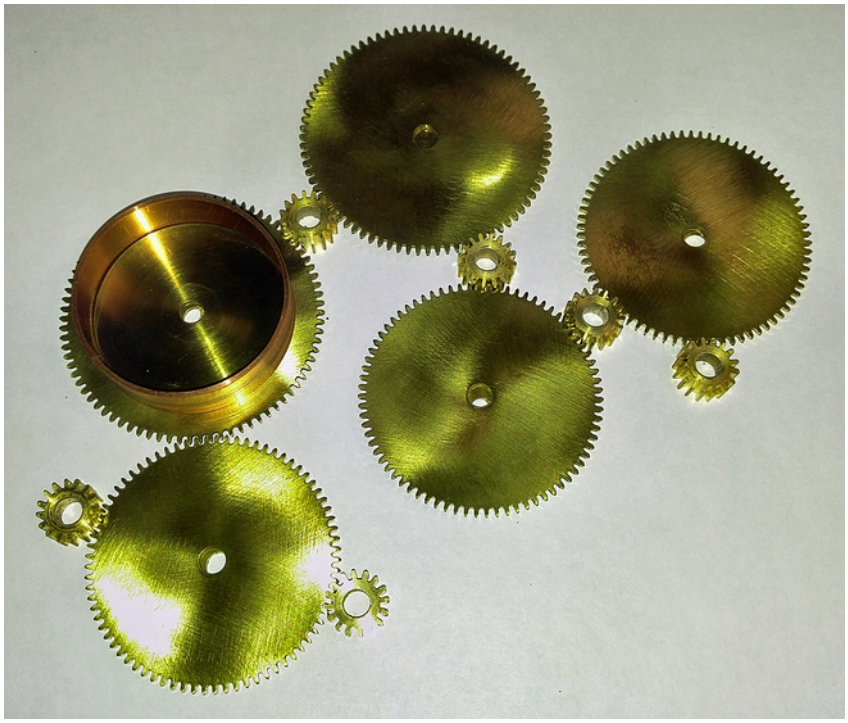
Shown here is the glued up stack with all 16 cuts completed. The tooth mesh was checked and the pinions then separated. To separate the 6 pinions I gently heated the glued stack with a propane torch to soften the superglue. Separated, the 6 new pinions looked like this.

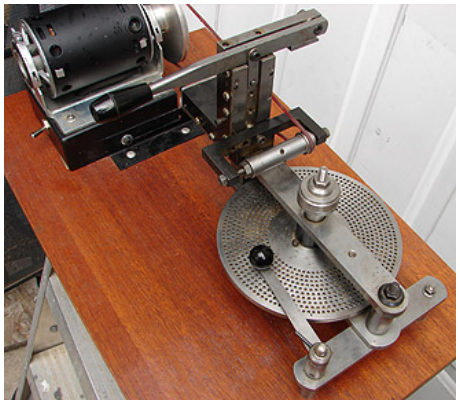


And below is a mock up of the pinions in the eventual drive train of the spring powered motor.

The wheels were previously cut using my Chronos Wheel Engine.

On the left in this image is the spring barrel partially made. It will have the drive gear soldered to it. This will power the whole motor including take offs for various actions.





The Chronos Wheel Engine that wes used to cut the wheels.