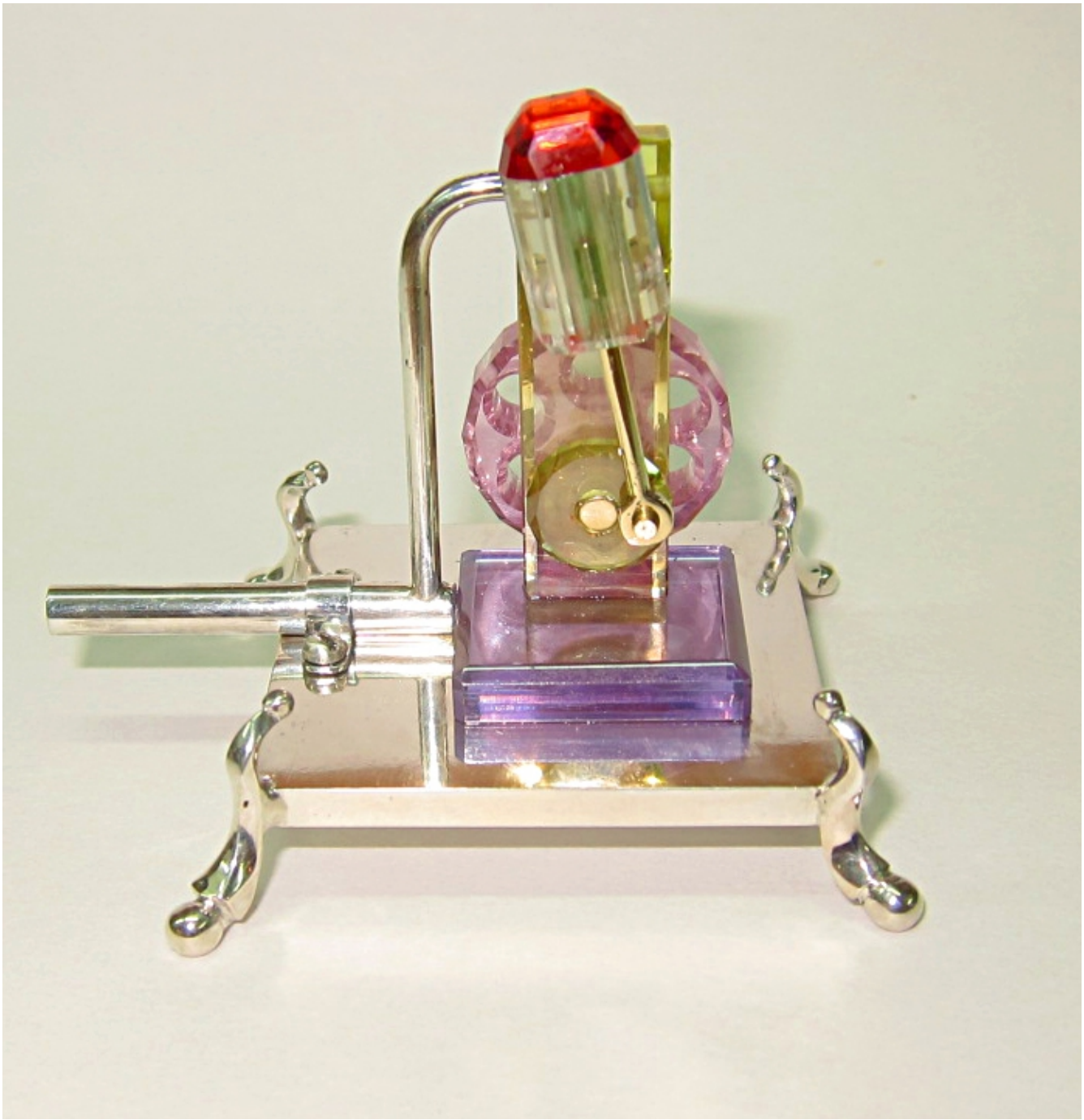
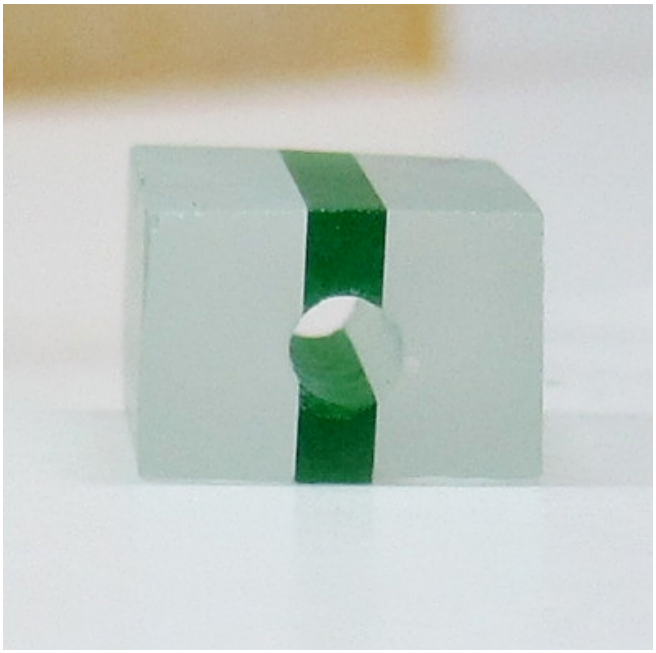
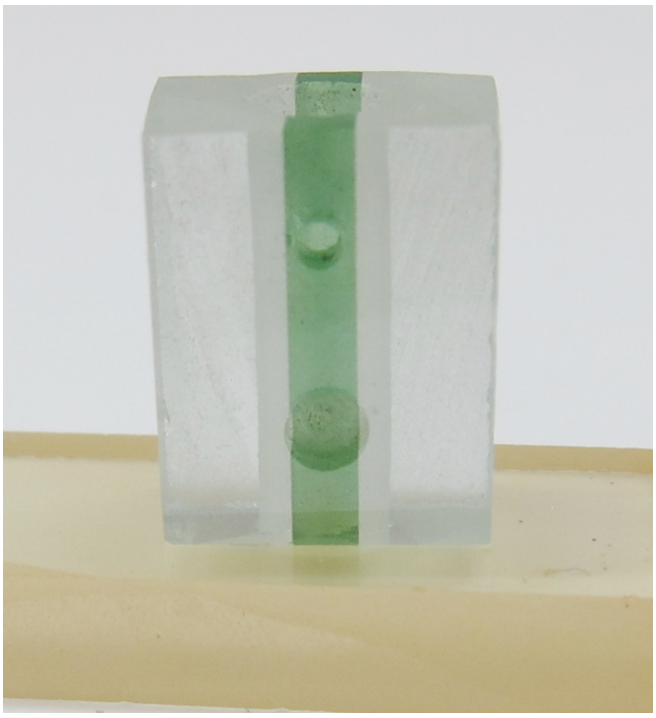
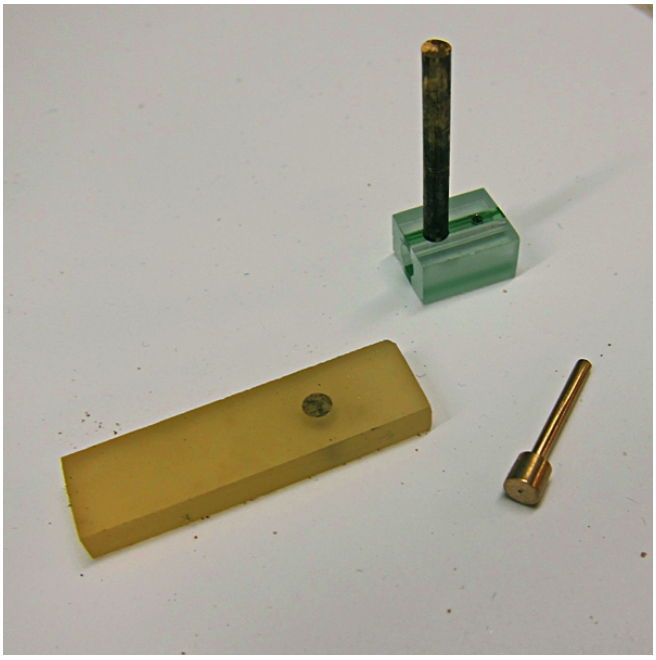
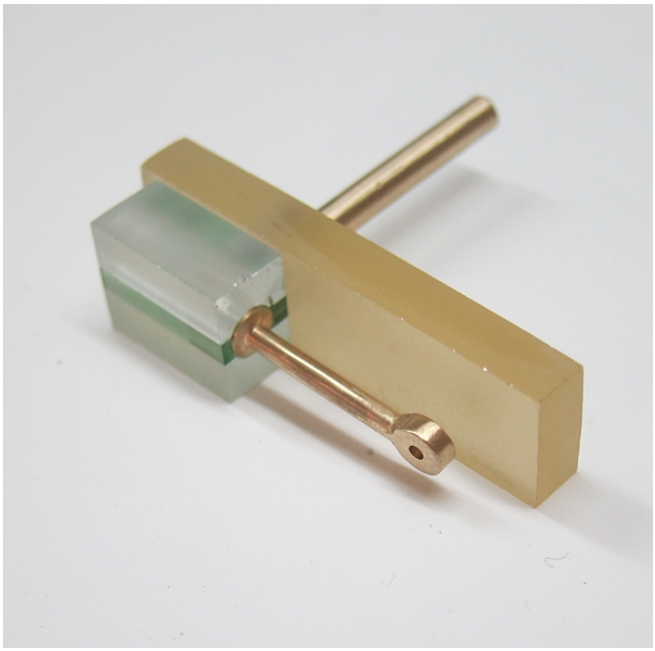
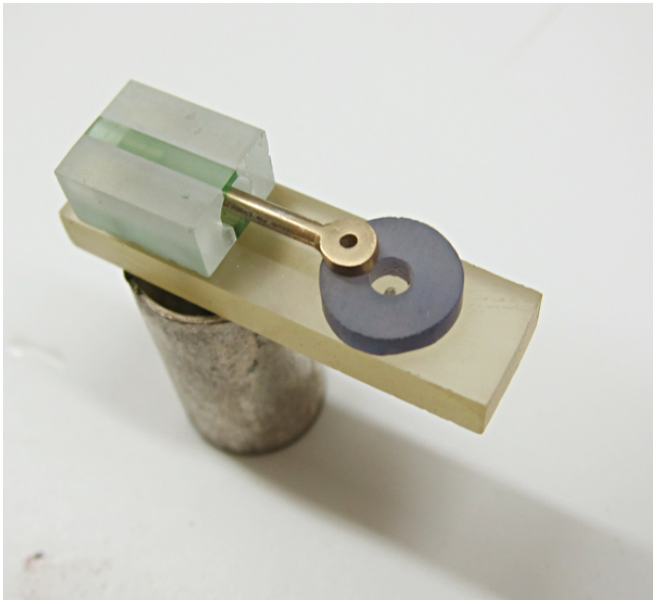
Faceted Cubic Zirconia Steam Machine

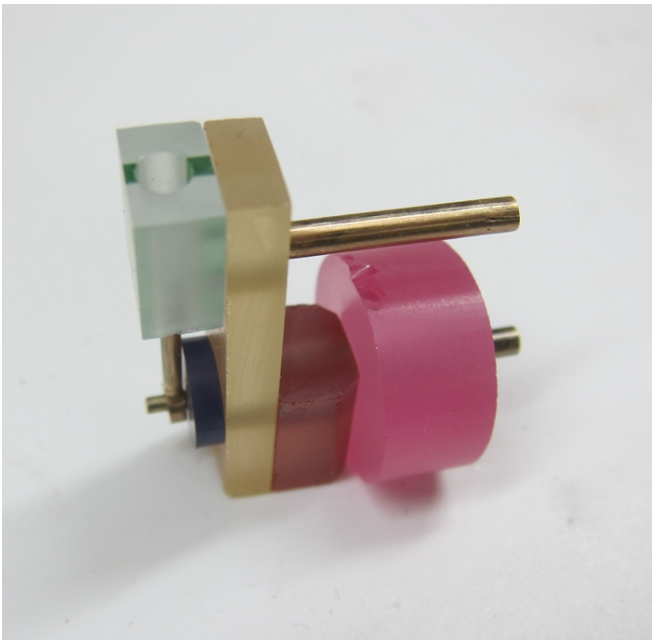


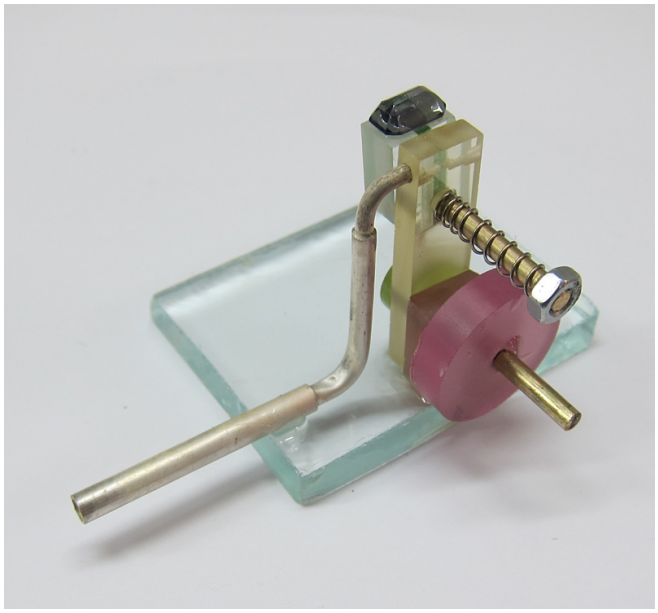
I start with raw Cubic Zirconia. It comes in many colours and these were the ones I had on hand at the time The brass wobbler is one that I made to see if I could make such small steam machines run. That one ran, so I figured a CZ one would as well.	
CZ gets cut with a diamond saw. The blade has diamond particles impregnated in the edge . It spins very fast and is lubricated with a constant water through flow. It is not sharp in the conventional sense so my hands are quite safe.	

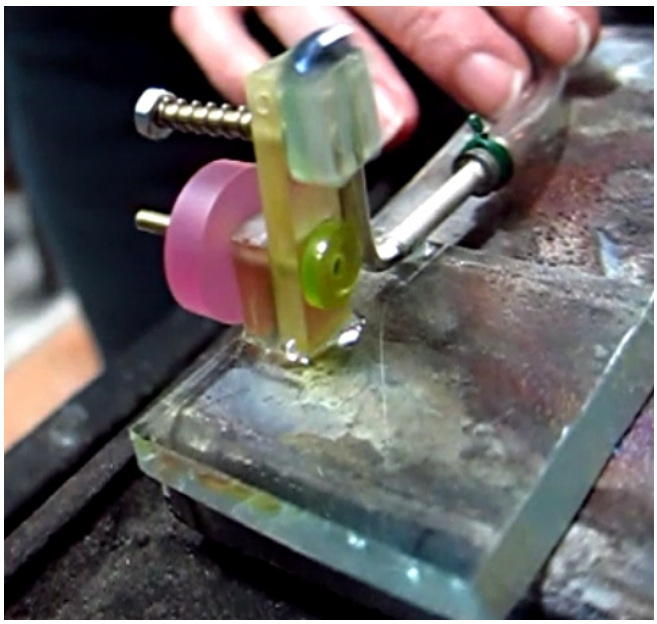
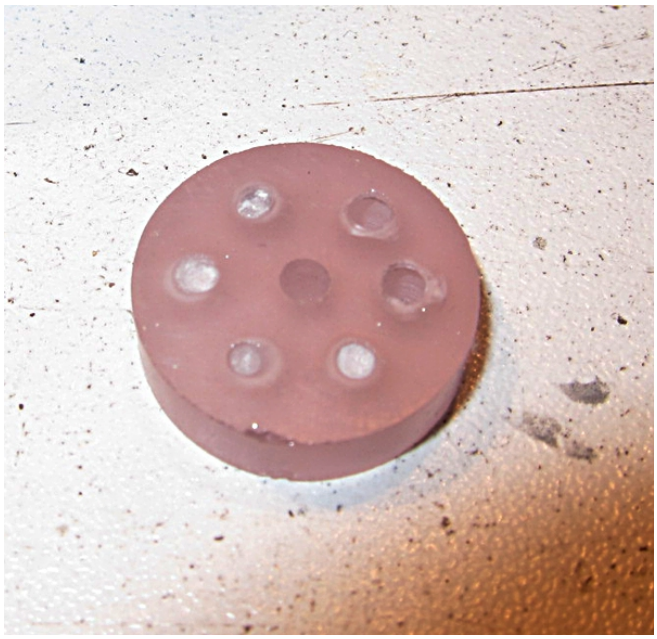
I laminated three pieces of CZ together just for fun. I use a epoxy resin called HXTAL which is clear and takes five days to harden. I used that resin throughout the project and it is so strong that the laminated pieces are stronger than the parent material. It needs some patience though, because it takes five days to harden. Anyway, here I drilled a hole through it using a diamond core drill under water. (for lubrication. This picture is looking lengths ways.	
You can see the vague outline of the cylinder in the clear part on the lamination. The top hole is the inlet/outlet port and the bottom hole is half drilled and is where the pivot will be attached.	

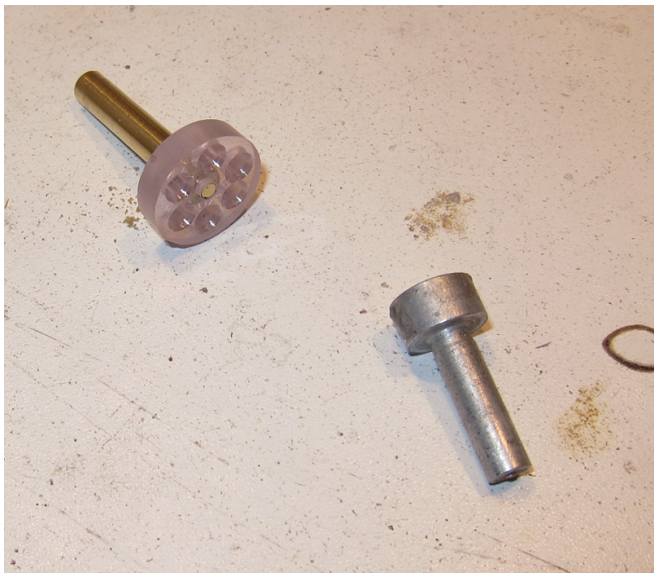
The yellow piece was first of four center posts I made. All the others broke. As I said, patience was strong in this one. The center pivot is fitted loosely in the laminated cylinder and the piston has also been turned on my lathe. The pivot and piston are made out of 14 ct gold.	
Here the pivot and piston are being checked. I have also made the bottom end of the piston, which is the part that will go into the crankshaft.	

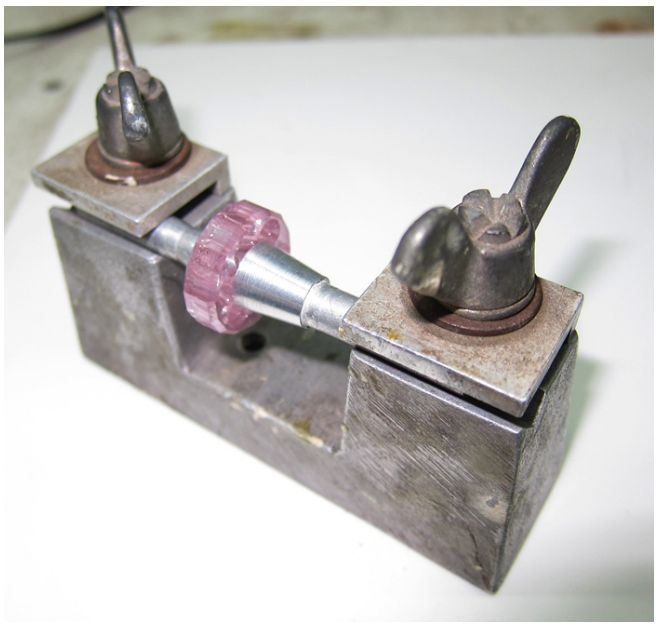
Cutting the crankshaft wheel	
Fitting the rough crankshaft wheel to see where the bottom pin must be drilled.	

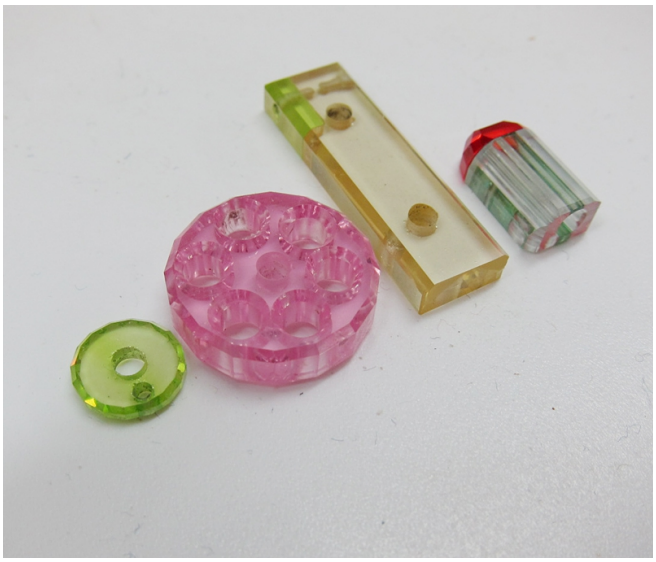
All the CZ being roughed out. The pink will become the flywheel. The maroon piece is the flywheel shaft bearing. It's colour change material, maroon under incandescent lighting and yellow under fluorescent lights. The purple is the crankshaft wheel	
Which promptly broke. I made seven of these before I got one that worked well. CZ is a very brittle material, and some colours are decidedly more brittle than others.	

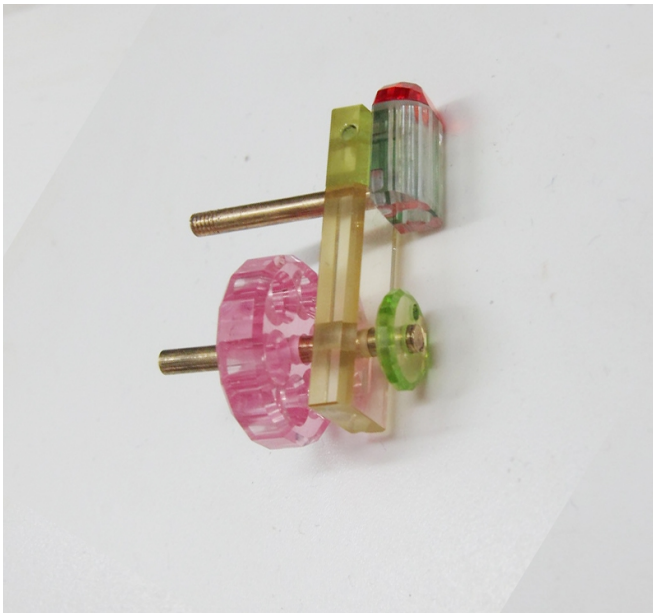
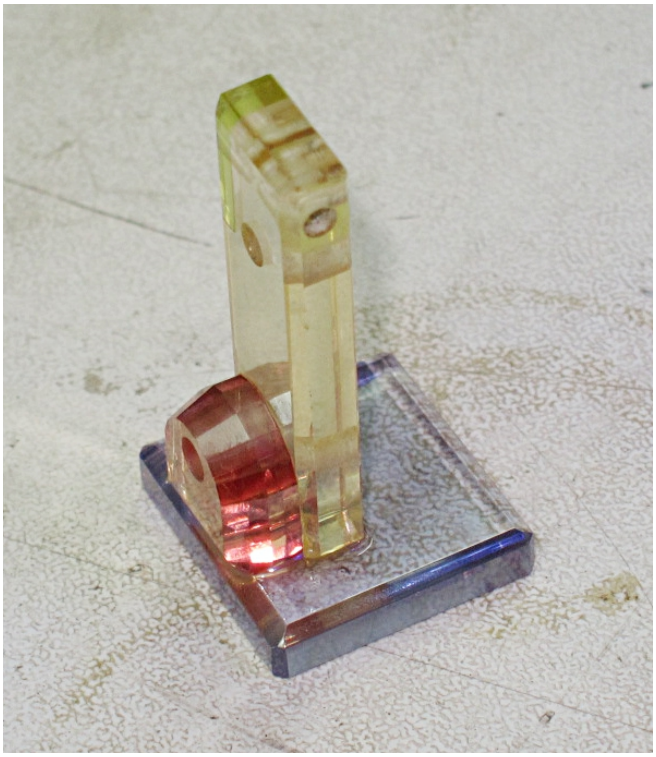
Cutting another one.	
I had to see if the thing would actually run before I started faceting all the individual components. So I stuck everything to a piece of glass and made some temporary silver tubing and connected it to my compressor. The cylinder has a upside down Iolite gemstone glued onto it temporarily just so the cylinder can keep pressure. Classiest cylinder head in the world.	

And run it did. With my ever faithful and loyal wife helping him with his next crackpot project. Bless!	
Now that the concept was proved to me I could start faceting the pieces of CZ. So then I proceeded with the crankshaft wheel, first drilling the holes with a diamond core drill.	

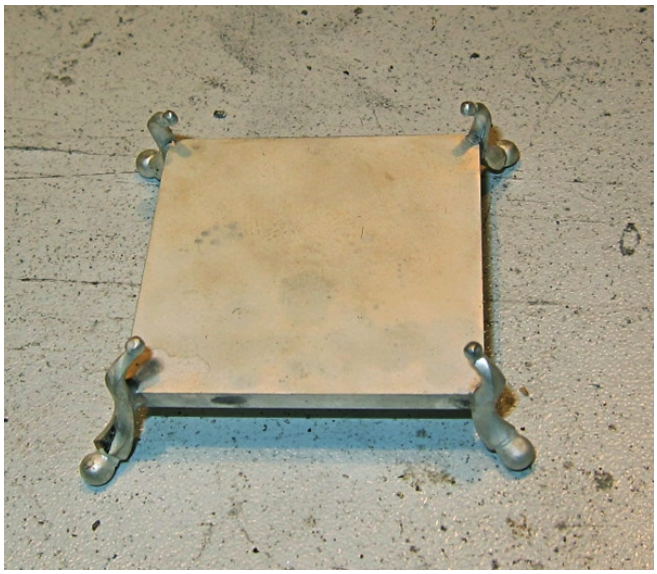
Smoothing out the holes before polishing the insides. One always has to work wet. The white bowl contains water.	
Ready for faceting.	

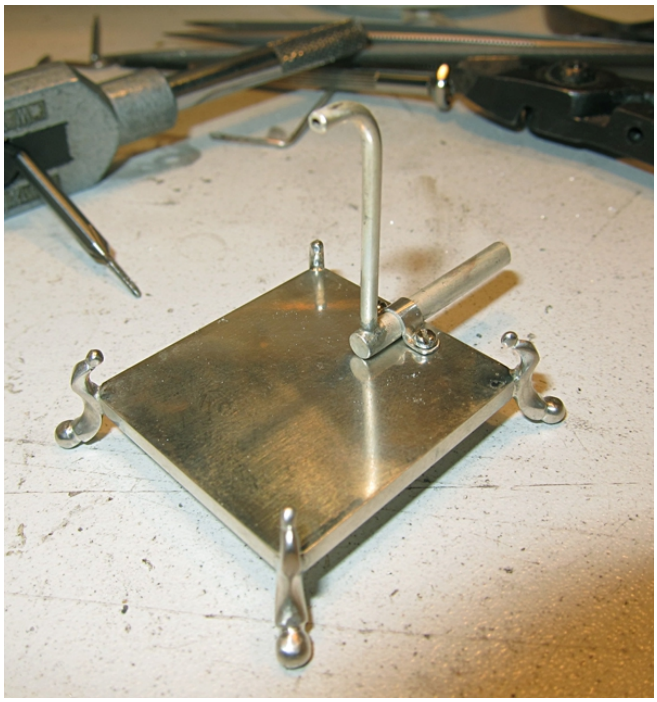
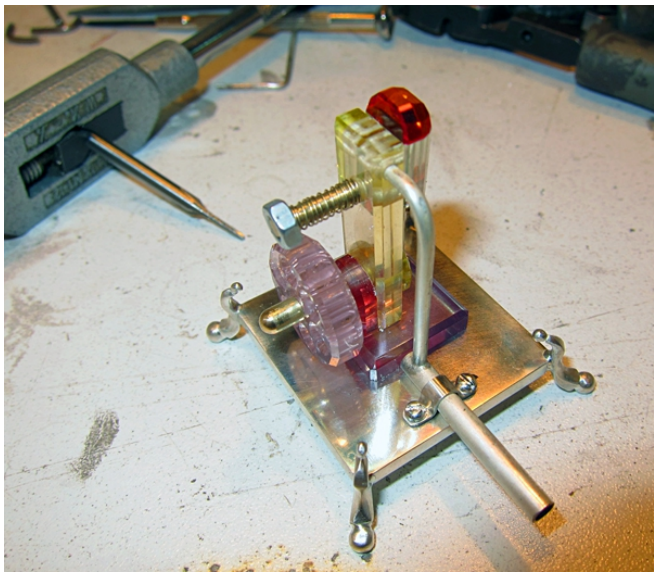
Being dopped. This is a transfer jig. One first facets one side then it is transferred and the other side is is faceted.	
Finished, cut, drilled and polished. Just love that pink colour.	

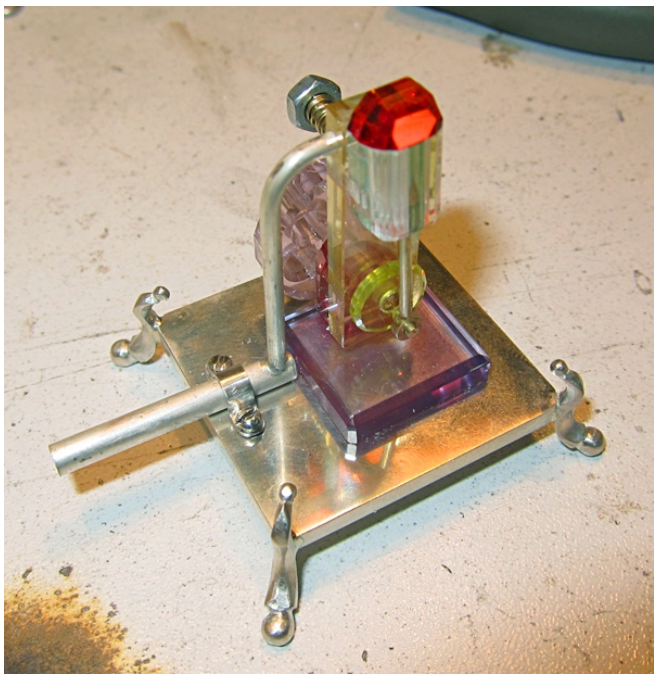
The upright and crankshaft wheel nearly finished. Just the pivot hole had to be polished in this picture. At the top are the two inlet and outlet ports. They were very tricky to drill.	
Here are all the cubic components finished faceting. There are about 260 facets all in all.	

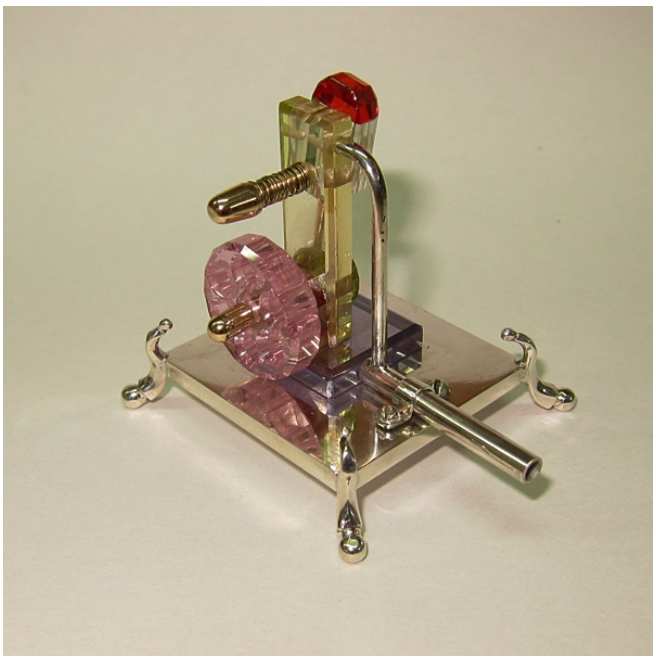
Here are all the components waiting for the base.	
I made the base out of a colour change piece of CZ It goes red under incandescent light. This was a critical stage, because if anything was skew, the resin would not allow me to remove anything and the project would have to be scrapped. So I was very careful.	

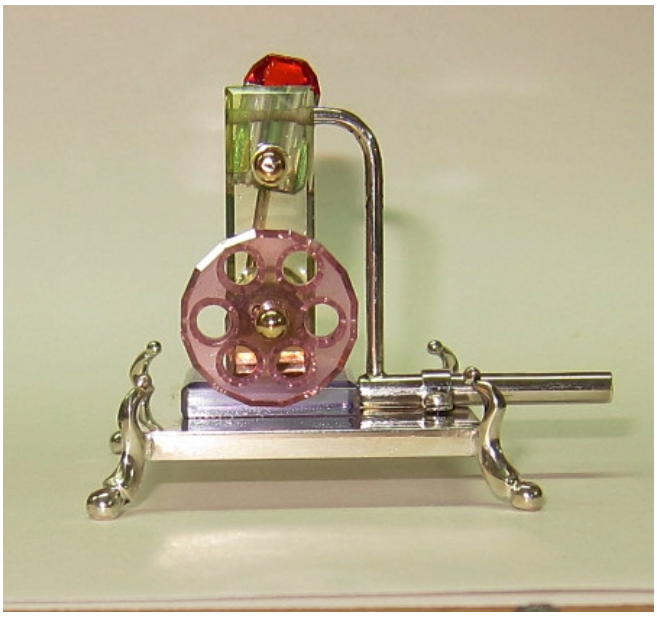
Now was time to make the silver base stand. So I melted some silver, cast a plate, rolled it to about 2.5 mm and sawed it to shape.	
Once I had it shaped, I cut cast and rolled and bent some leg blanks.	

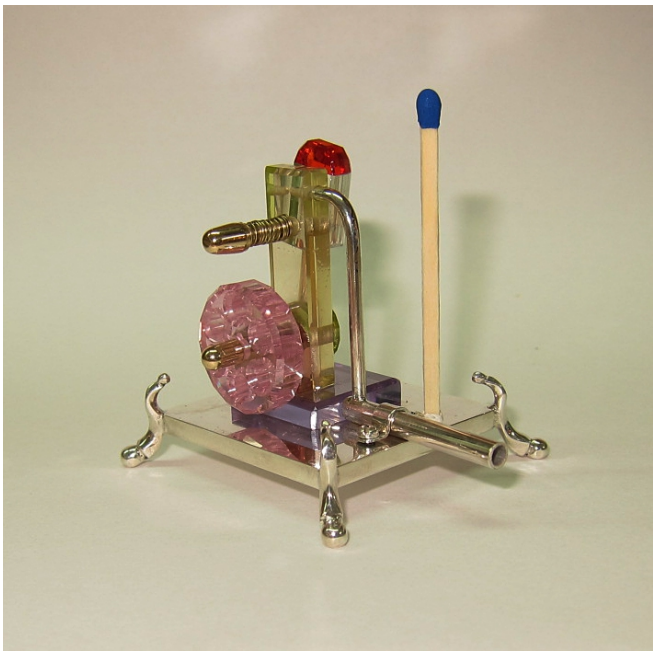
Then I filed them to shape.	
And I soldered them to each corner.	

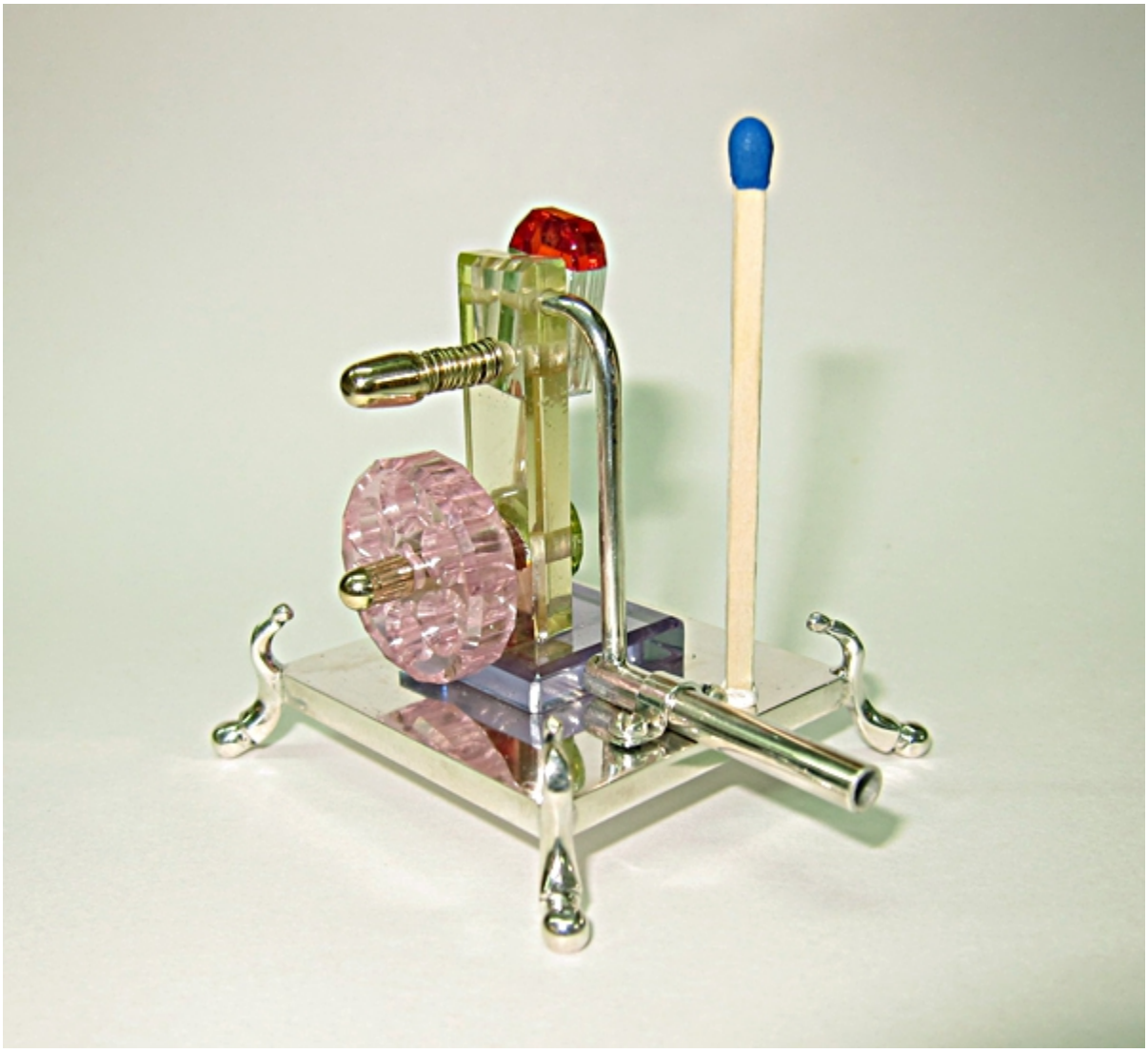
I made some tubing for the inlet. This had to be made very accurately, because when you insert it into the CZ and if it is only a little bit skew, the CZ will crack.	
Fitting the little motor onto the stand. The nut in the picture is replace by a gold cap. The spring next to the nut I also made out of gold. All in all there are 20 grams of gold in this motor.	

Once everything was adjusted, I took it all apart and polished the silver and gold components.	
All that was left was to make a display case for it.	









About 100 hours of work.

264 facets

20 grams of 14ct gold

50 grams of silver.

There is a video of it running on my You Tube channel HERE