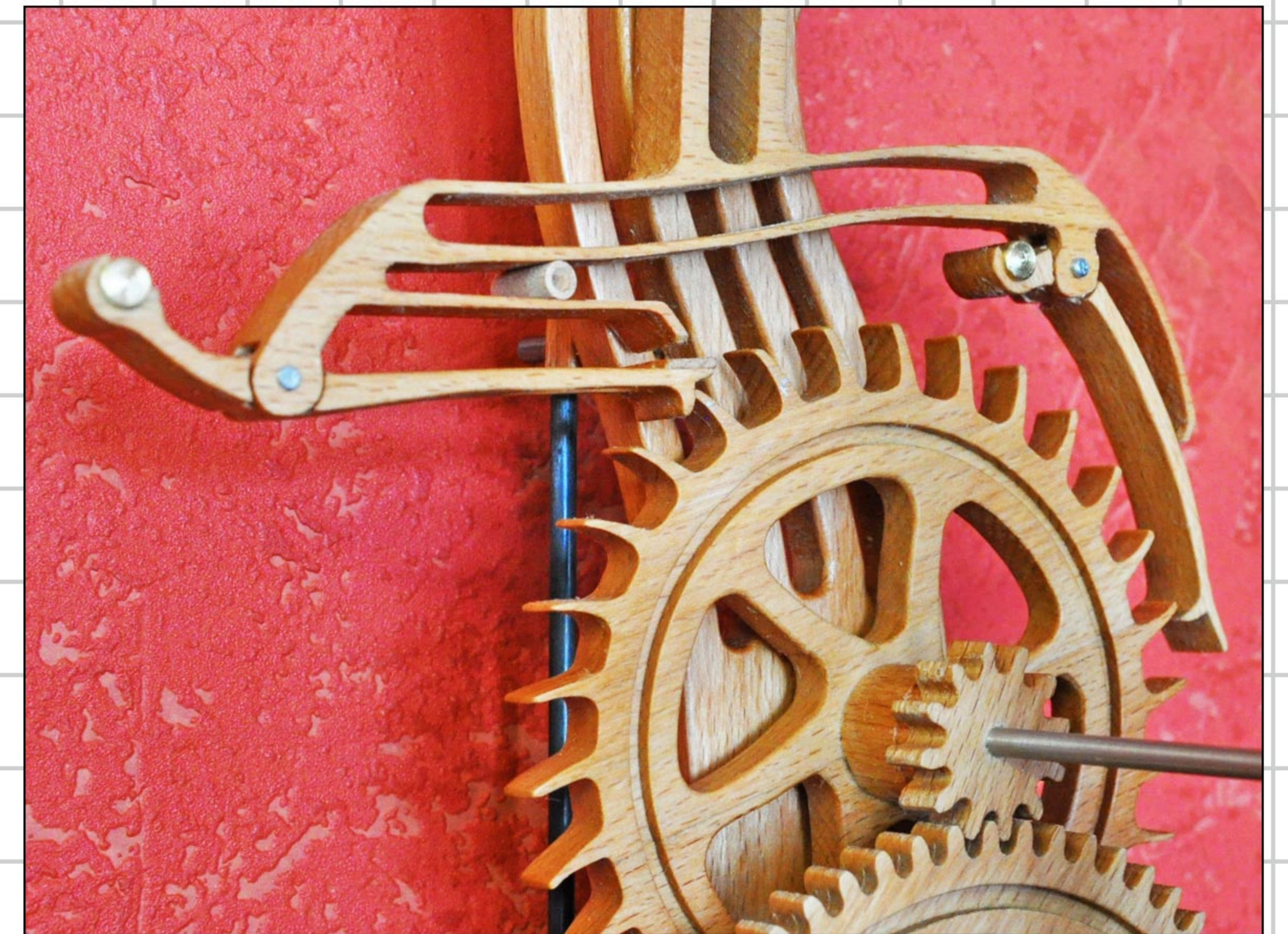
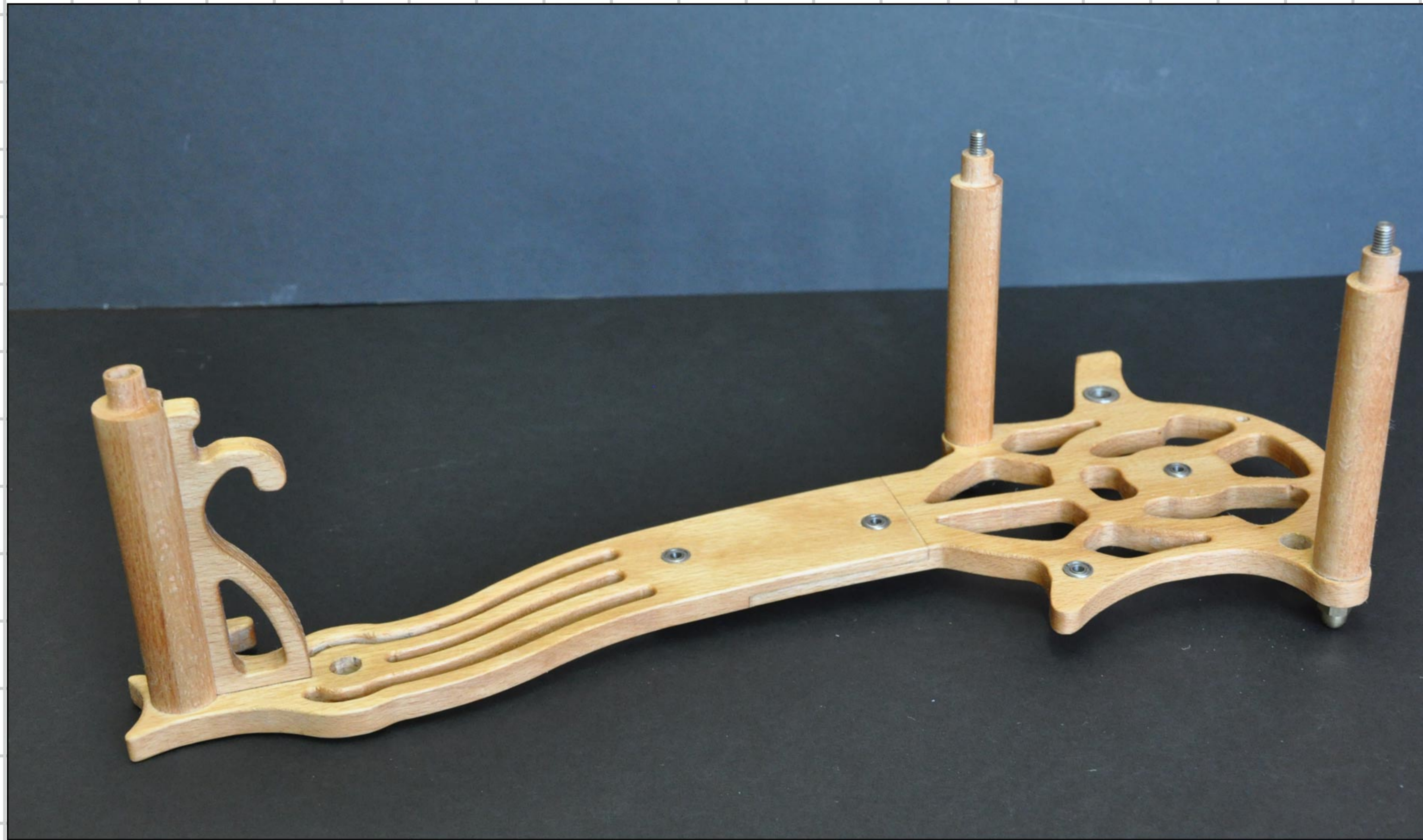




This clock follows directly on from the development of the stand alone grasshopper escapement published earlier this year. It is incorporated into this complete clock design which is designed in the style of the Art Nouveau movement from the turn of the twentieth century. I have laid out a series of assembly instructions to make it clear how all the different gear assemblies and parts fit together, so that along with the detail drawings and the rendered images it should be clear to the builder how create their own clock. To ensure the minimum of friction in the design Ball races are fitted to all the shaft pivots .



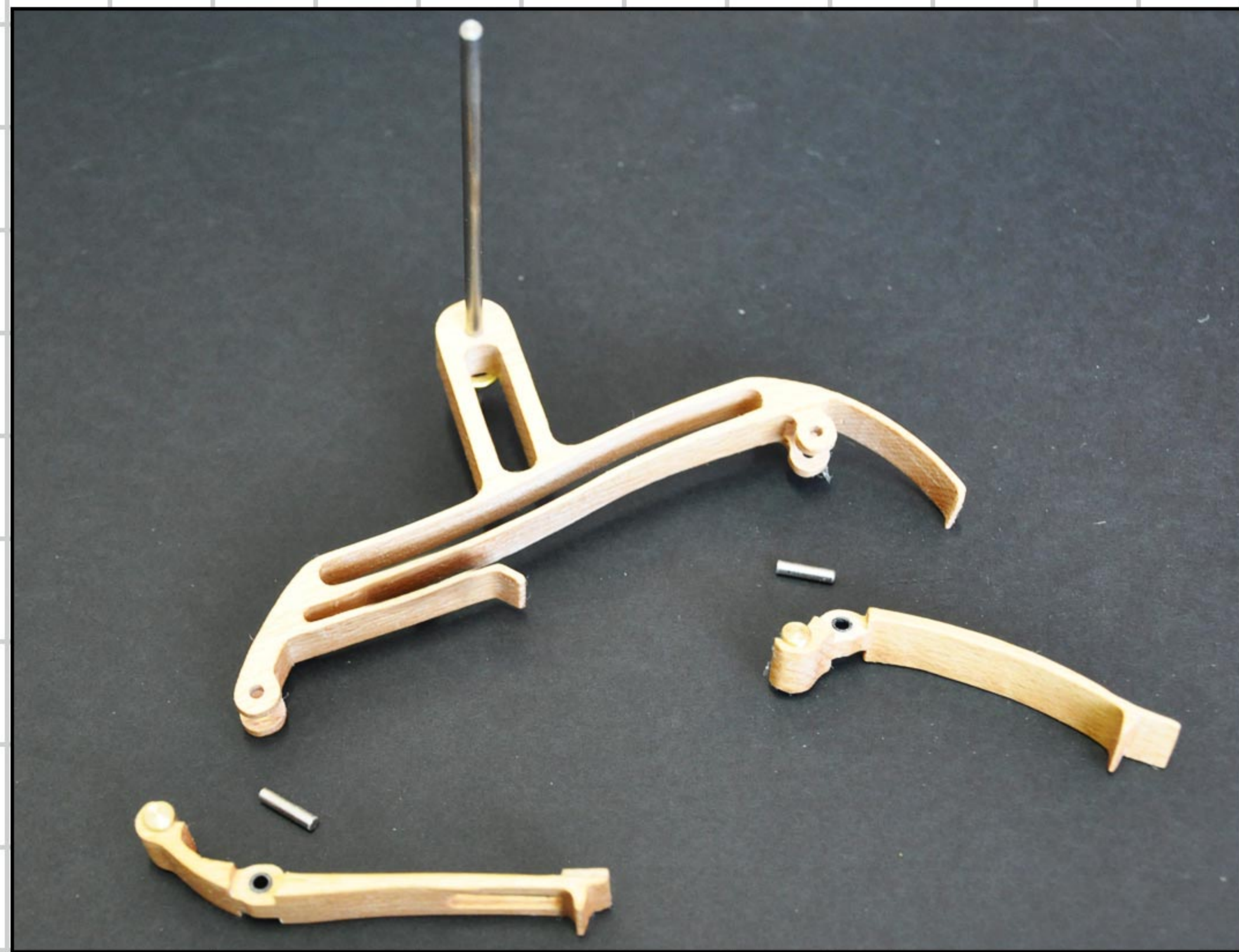


The first step is to glue the spacers and bracket into the Back frame, and to fit the threaded rod into the two lower positions

When that is complete fit the roller bearings into position either as a press fit or using a Loctite or similar steel holding glue.

On the opposite face attach the caps into the bearing holes which will prevent the shafts sliding through.



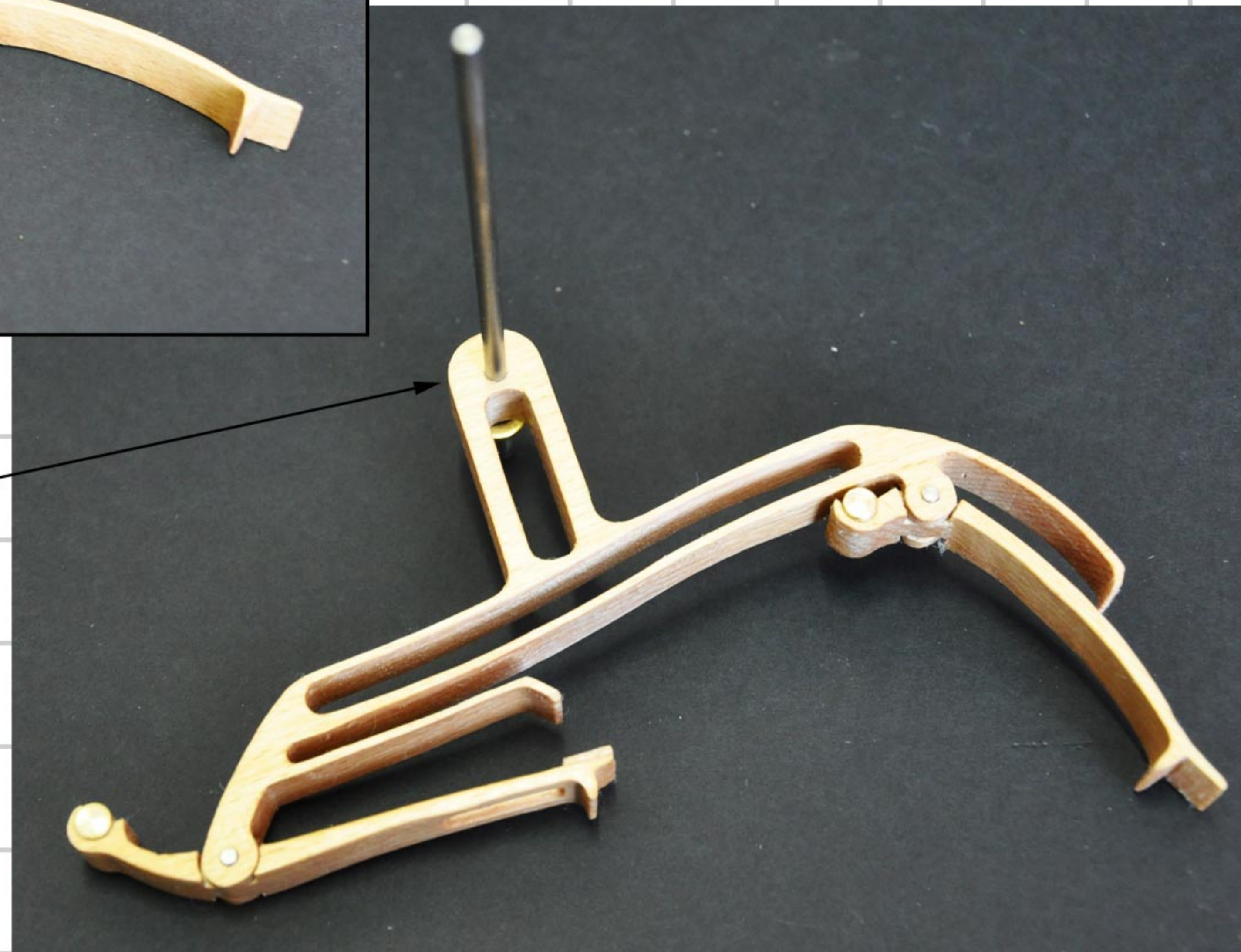


Fit the Grasshopper center Arm onto its shaft and secure with a grub screw ensuring it is positioned the correct distance from the end of the shaft.

Having fitted the brass counter weights into the ends of the arms, fit the arms themselves to the center arm with the small 2mm pins.

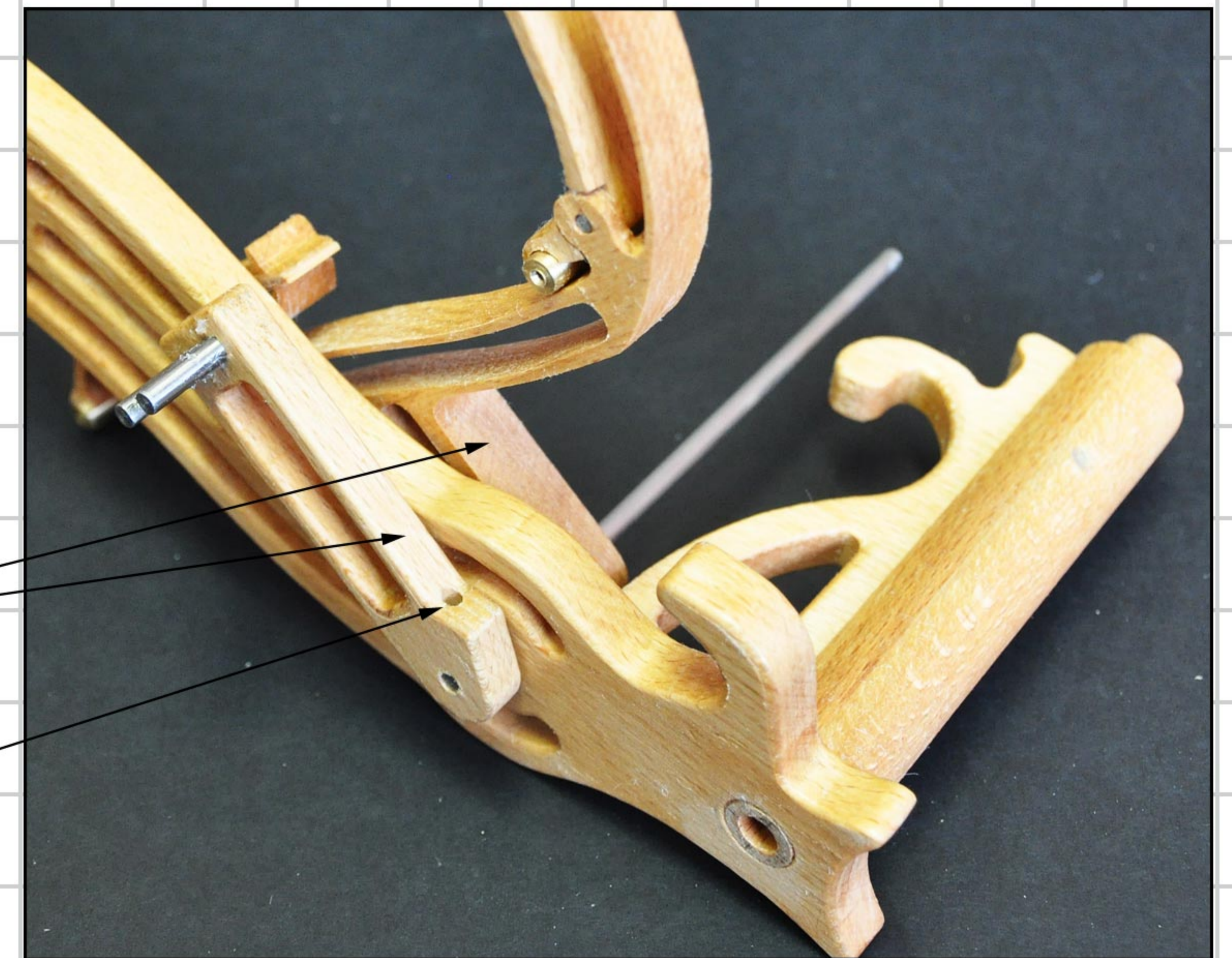
I had fitted a small plastic bush into each arm to ensure smooth movement of the two arms on the center arm.

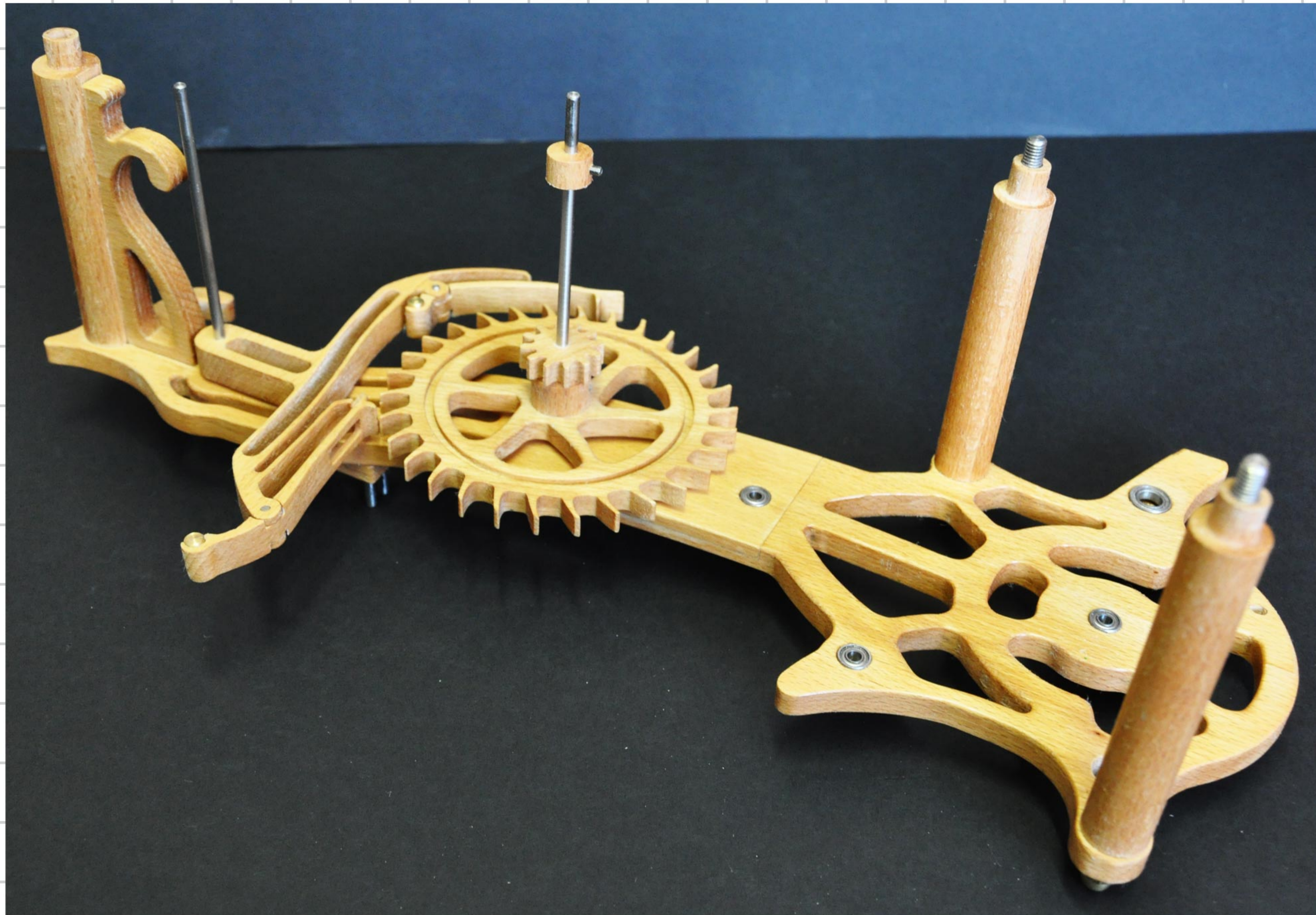
Grub Screw



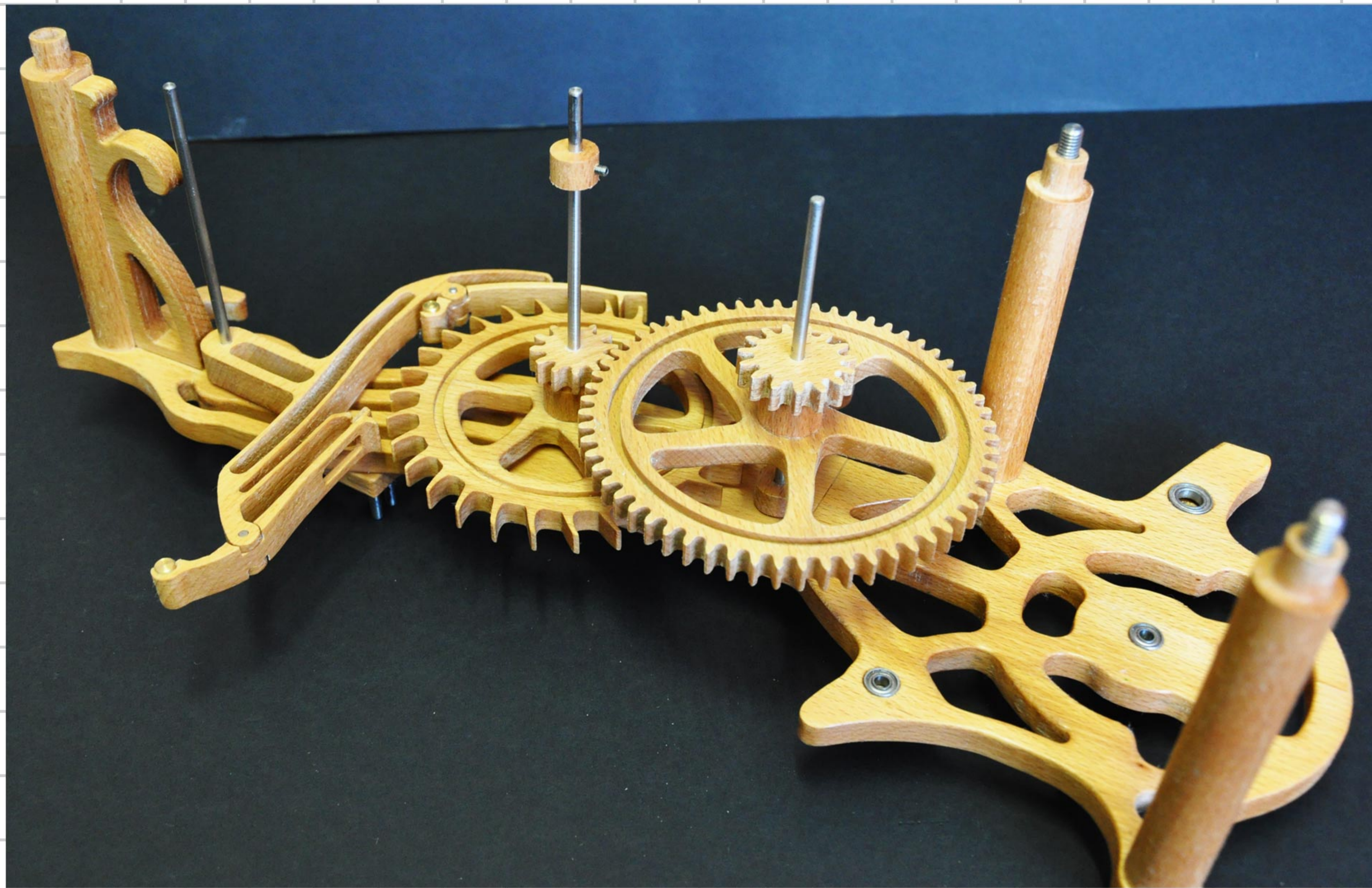
Now fit the Yoke onto the same shaft at the the back of the frame and secure with a grub screw. These two surfaces should be approximately parrallel as a starting point from which they can be adjusted when the clock build is complete.

Grub Screw



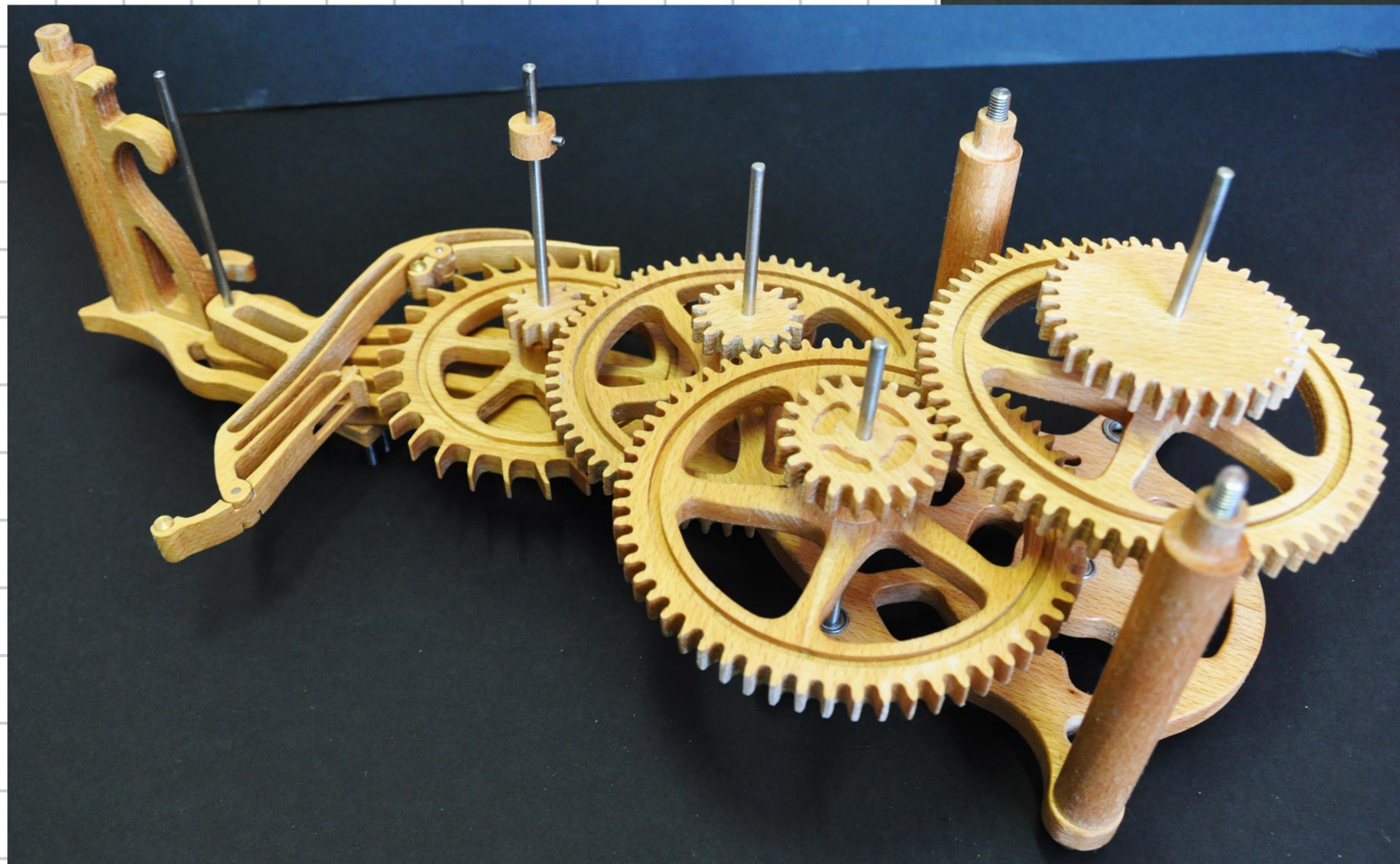
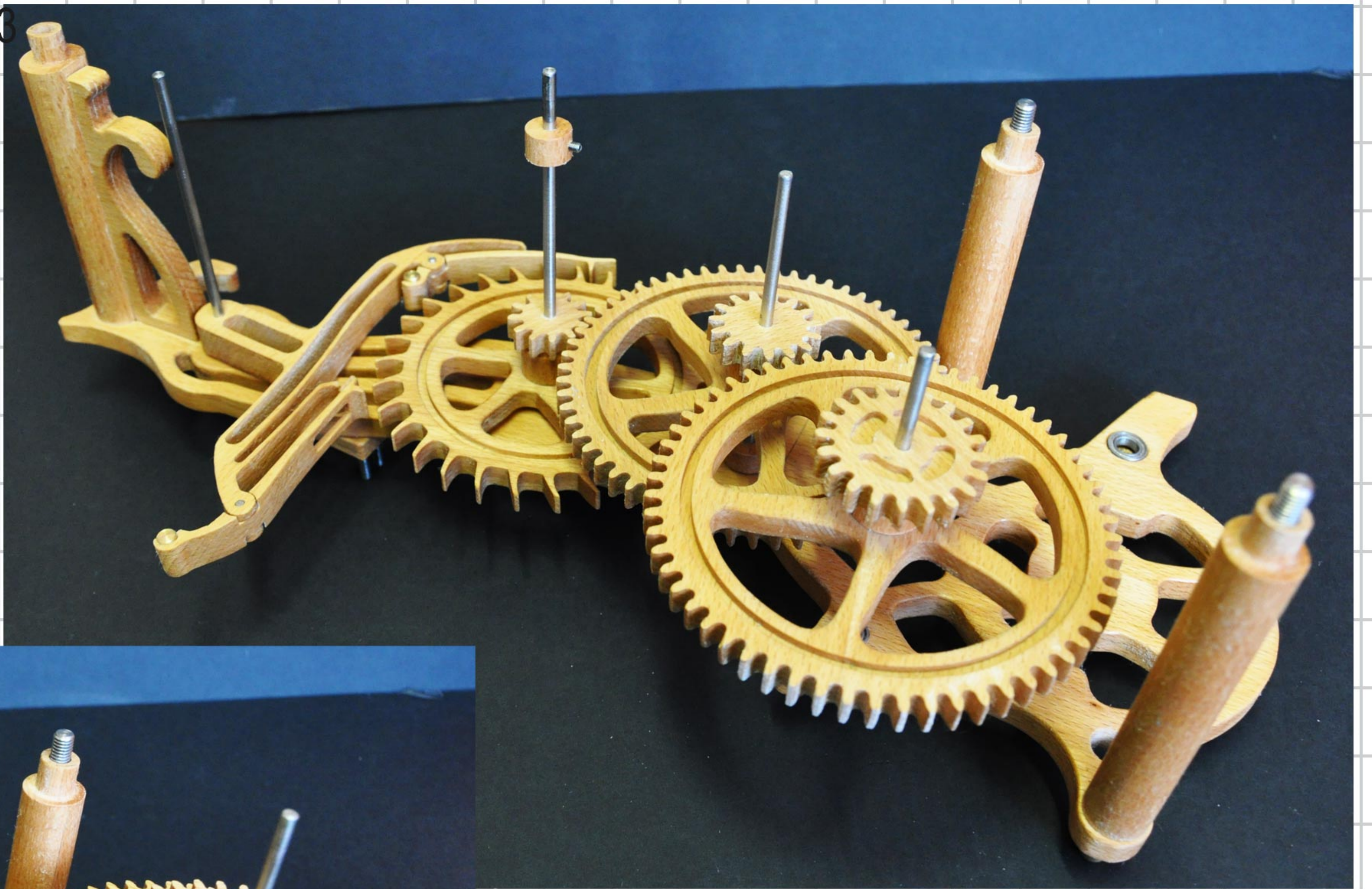


Before proceeding with the next step all of the five gear trains need to be fitted together in accordance with the assembly instructions on the detail drawings. The drawings show the parts and the positioning on the shafts, with each set of gears secured to the shaft with a grub screw to maintain it in its correct position on the shaft the photo above shows Gear train 5 which has the grasshopper escapement wheel on it, being fitted first.

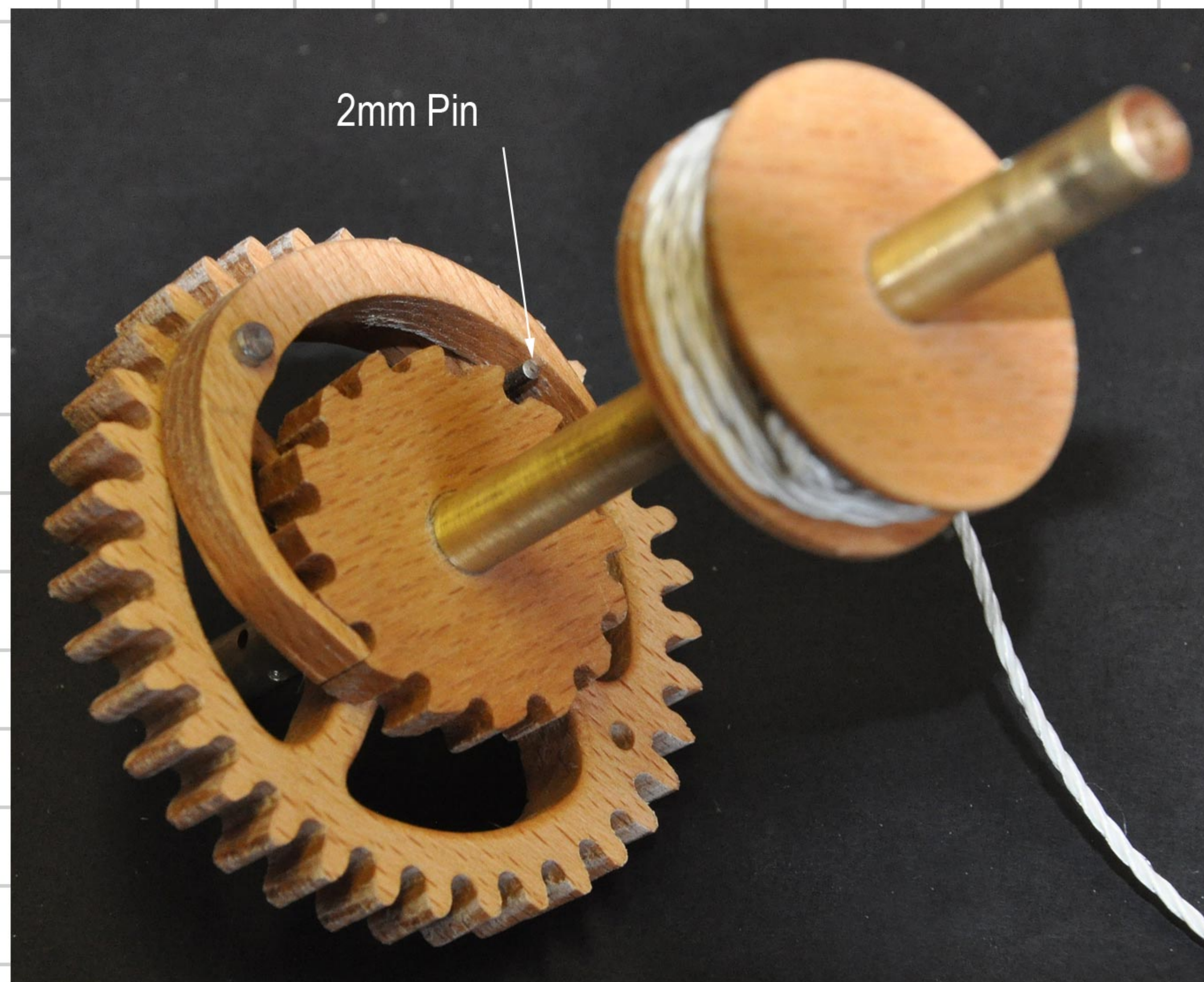


The next step is to fit the 4th gear train which has the maintaining mechanism attached to the back of the 60 toothed gear, this is free to slide on the shaft so that its peg can easily be engaged/disengaged from the gear whilst winding.

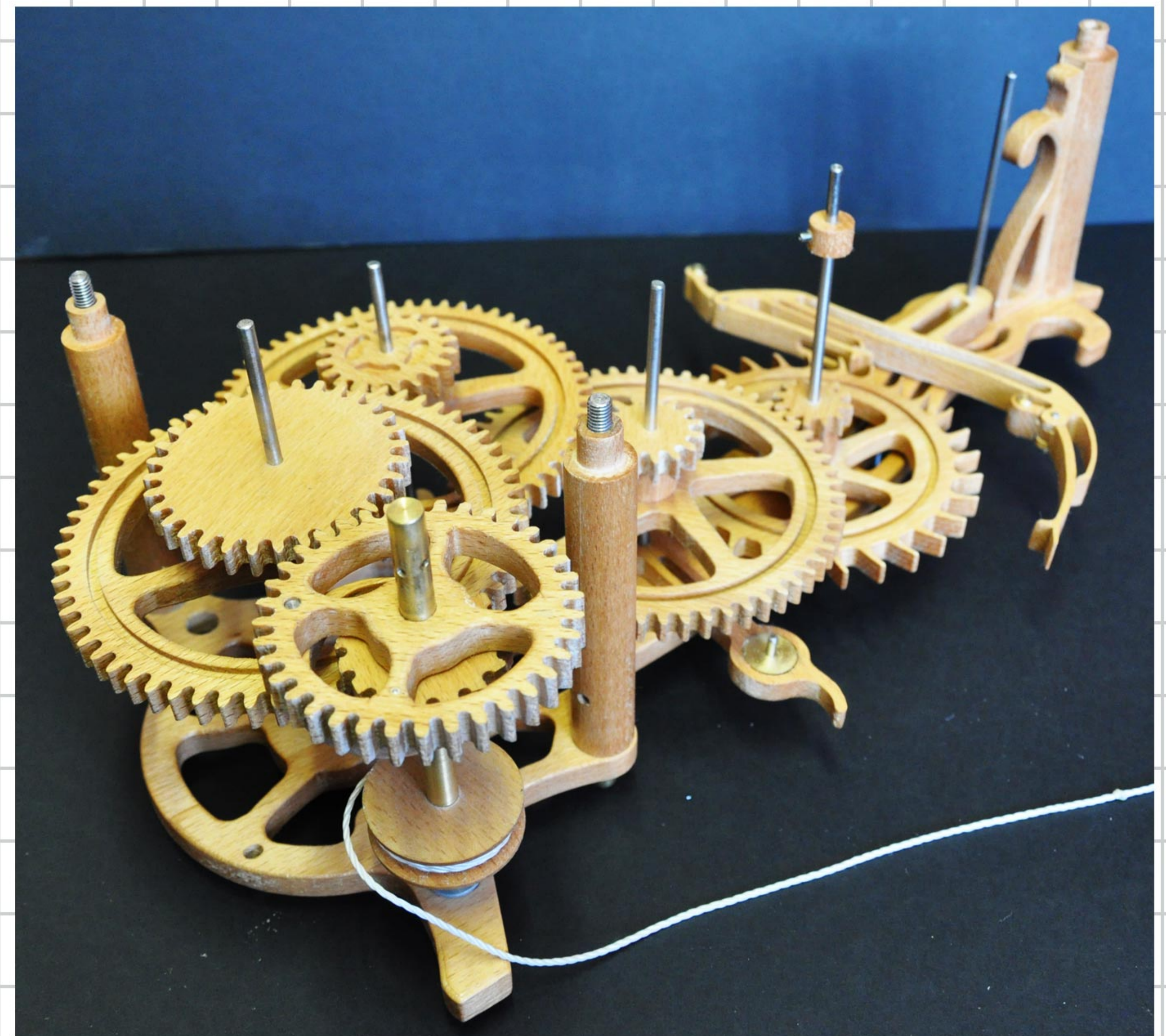
Fit gear train 3



Fit gear train 4



Gear train 1 is shown here fully assembled with the Ratchet, and drum pinned to the 8mm shaft. The winding gear is fairly loose fit on the shaft and has the Pawl pinned to it. The Pawl is held in contact with the ratchet by positioning this 2mm pin to apply a small sideways load to the Pawl. The cord which will carry the weight is shown wrapped around the drum.

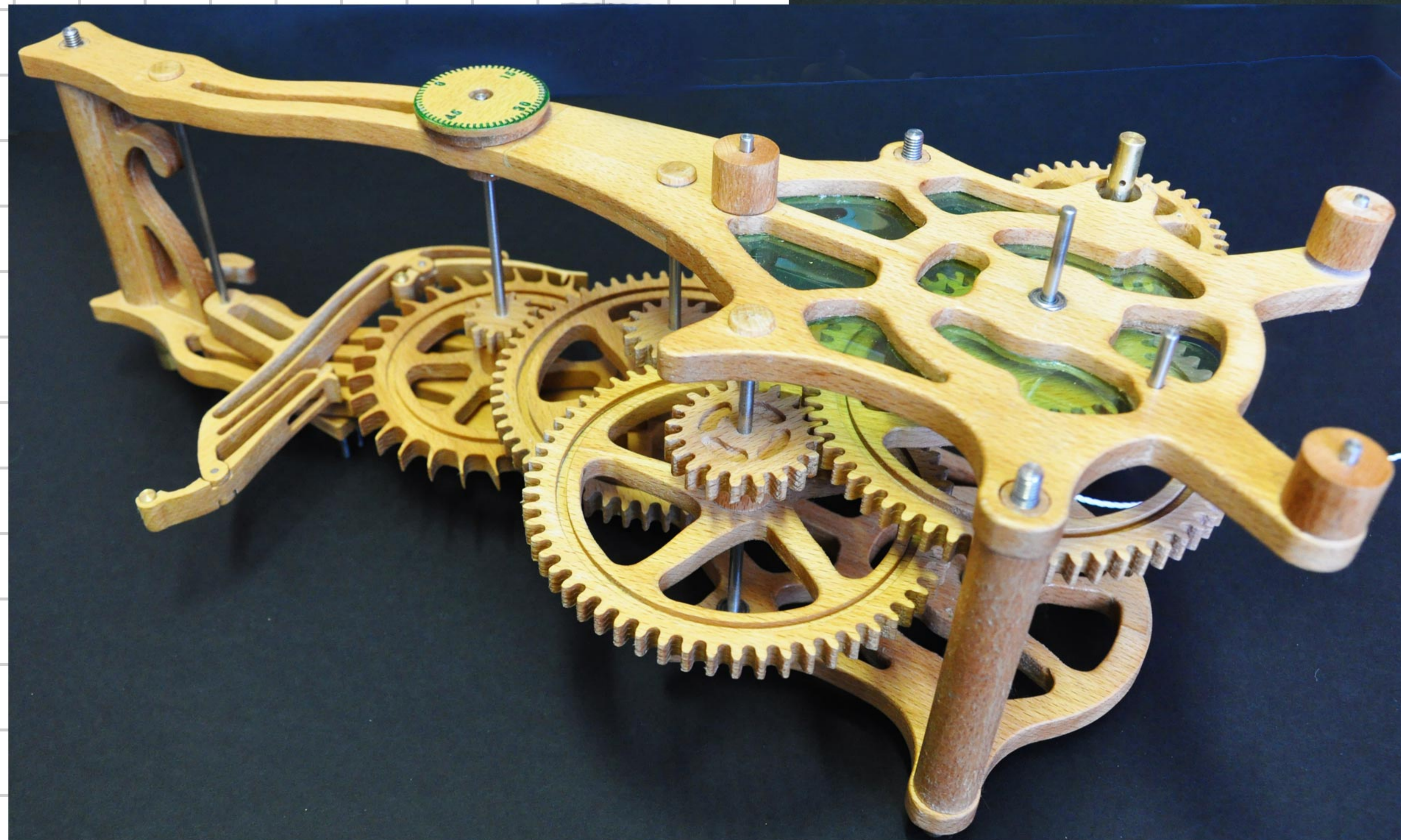


Gear train 1 fitted

The front frame is prepared by fitting the Bearings and Caps along with the Seconds dial. The main Dial pillars are also fitted at this stage.

In this photo you can see that I have fitted translucent plastic film into the recess's behind the centre windows.

This is purely a matter of personal taste and these can be omitted to allow the maximum visibility of the gears to be maintained.



The front Frame is fitted now, it can be a tricky step to get all of the shafts aligned with the bearings, but care must be taken whilst doing this as excessive force can damage the parts.

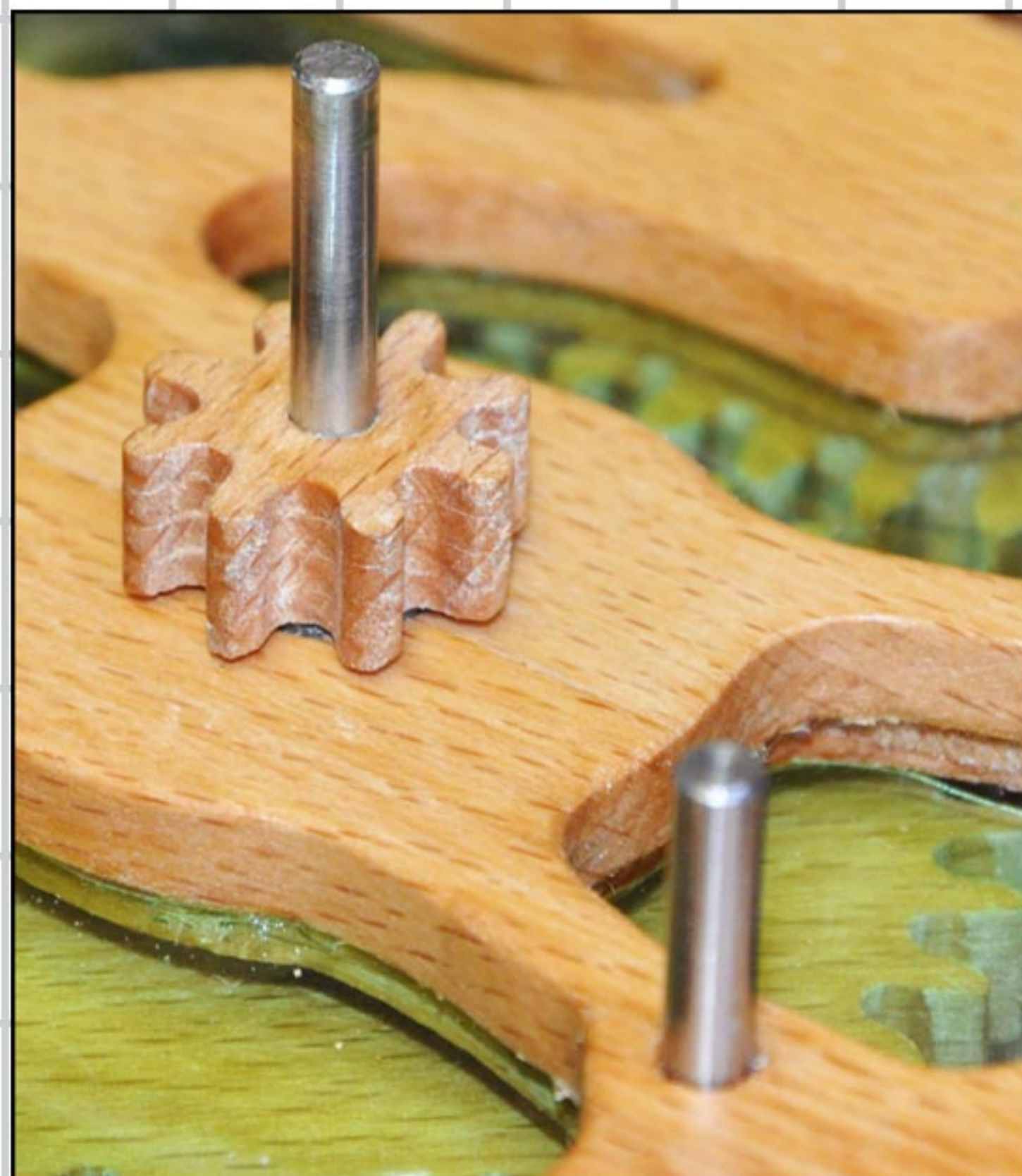


Fitting the Pendulum pivot and the domed nut



Fitting the Winder Stub using 2mm pin through the 8mm brass shaft

Fitting the hour gears and the hands



Fitting the clock to the wall



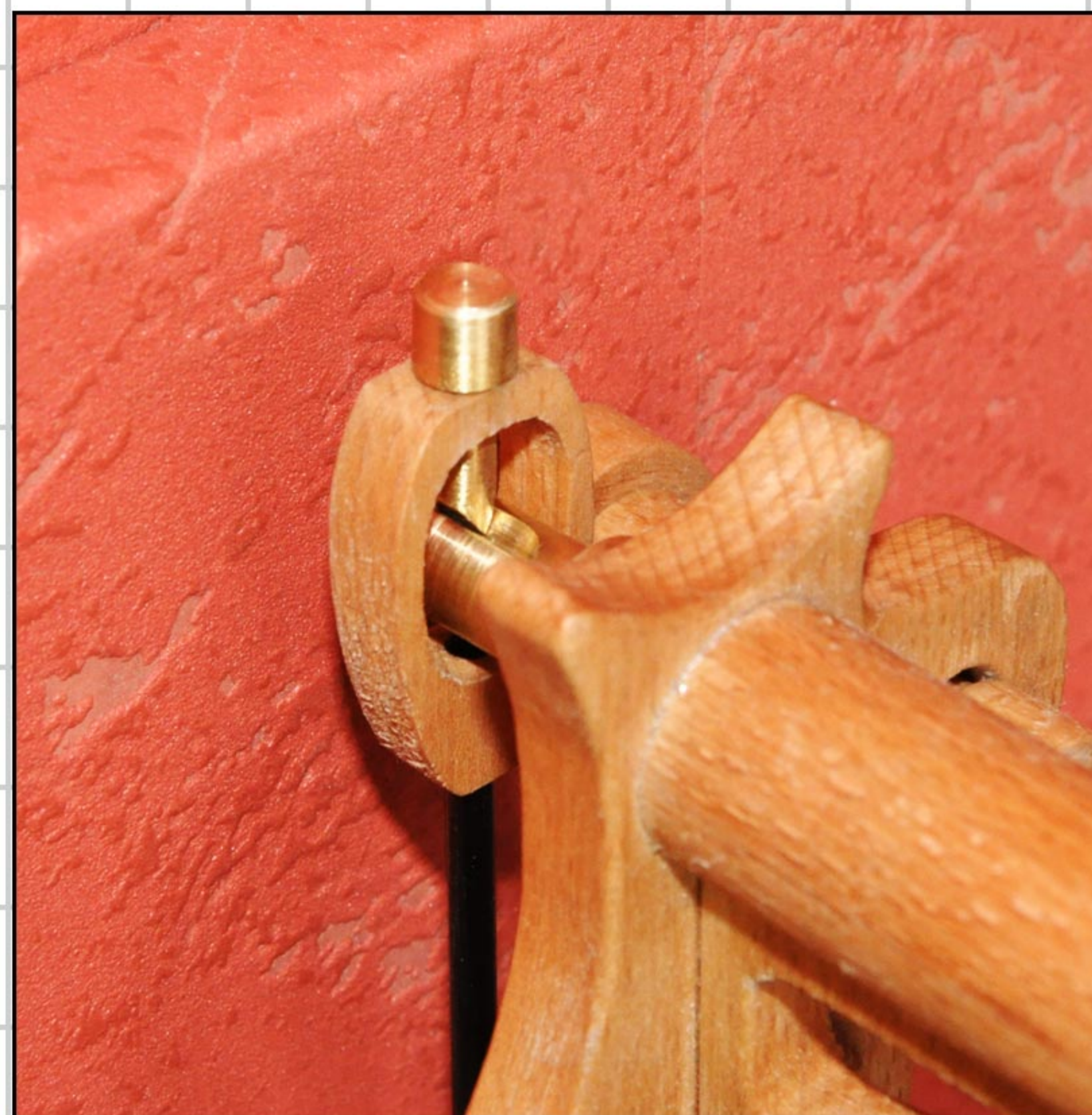
Hook the clock over the wall hanger



This fixing on the prototype has been changed to a hole on the frame that the wall hanger plugs into



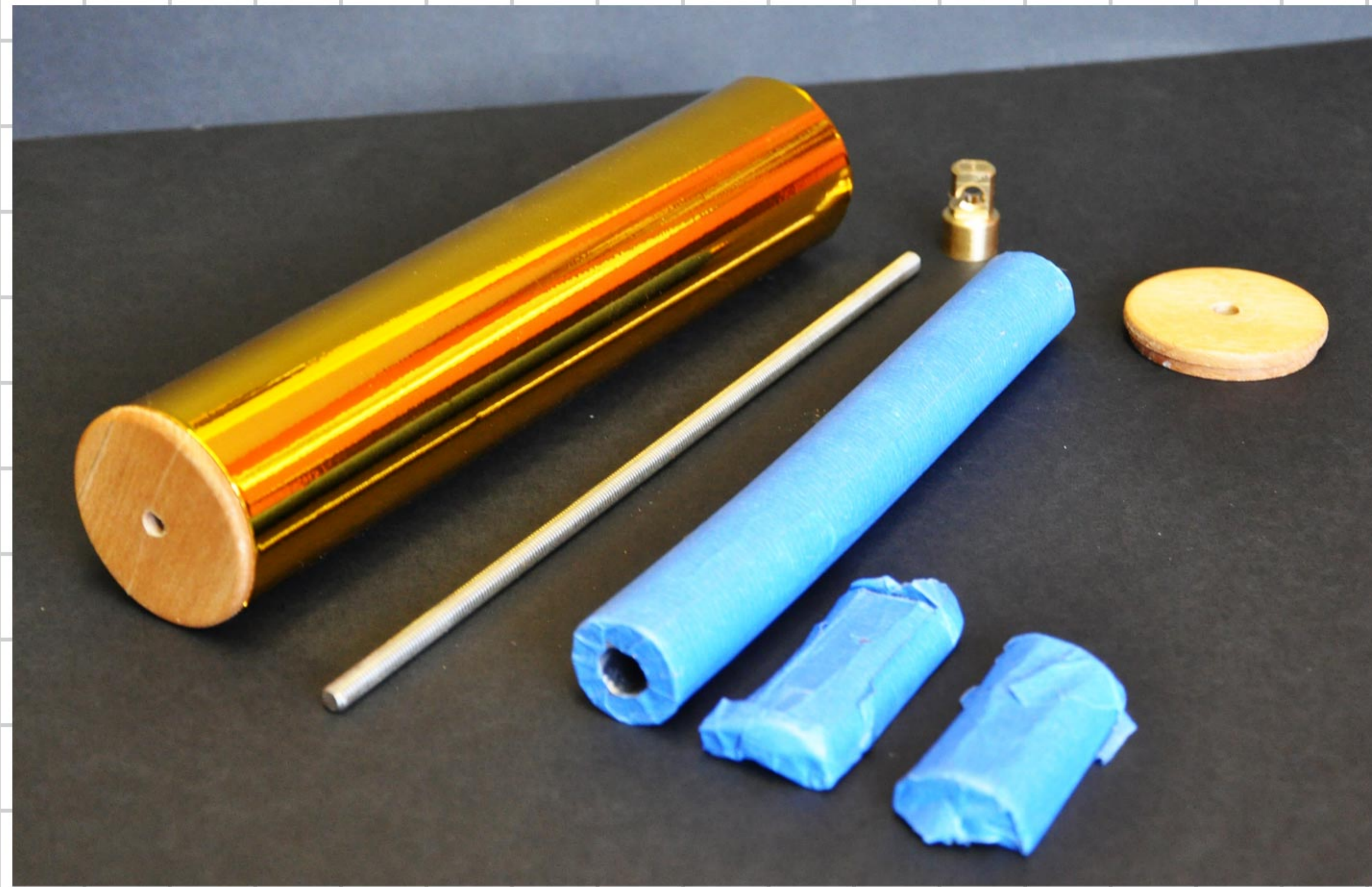
The bottom right support can either just rest against the wall as shown or be screwed to the wall.



Fit pendulum to Pendulum support

Ensure Pendulum Rod sits between the fingers on the Yoke





The weight used for this clock was constructed from a 2" plastic tube covered with sticky backed vinyl film in Gold. Two end caps were made the bottom one threaded for the 6mm threaded rod and the top one clearance. A brass screw on hook was used to hold it all together . The weights used were lead sash weights 1" diameter with sections cut to give a total weight of 1.5 KG.

Unlike the dead beat escapements used in all the other clock designs, the Grasshopper differs in that the impulse it gets from the gear train lasts for much longer and therefore tends to override the natural frequency of the pendulum.

This means that the accuracy of the clock movement is dependant on both the pendulum length and the the weight used to drive the clock. For this reason the pendulum has to be lengthened considerably to counteract the effect of the longer impulse. The more weight you use the longer the pendulum will have to be.

Because the weight will be dependant on how much friction is in your clock, you first need to increase the weight until the clock runs continuously and then adjust the pendulum length to get the accuracy.

In the prototype I have used a weight of 1.5 KG and a Pendulum rod length of 1300mm.