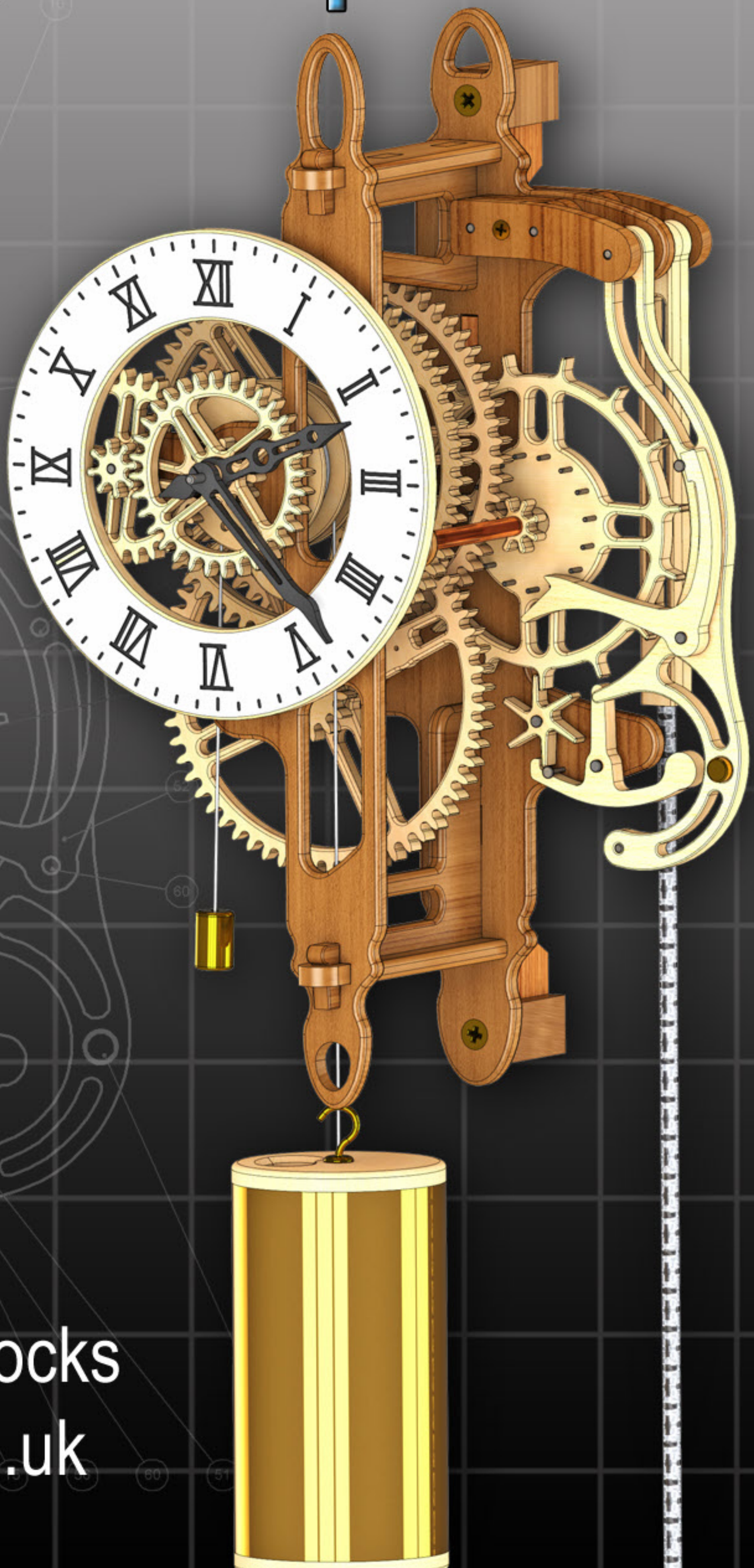
How to design and Build a Wooden Clock with Gravity Escapement

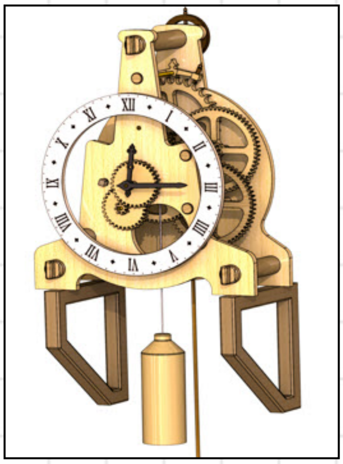
inch version



Brian Law's Woodenclocks

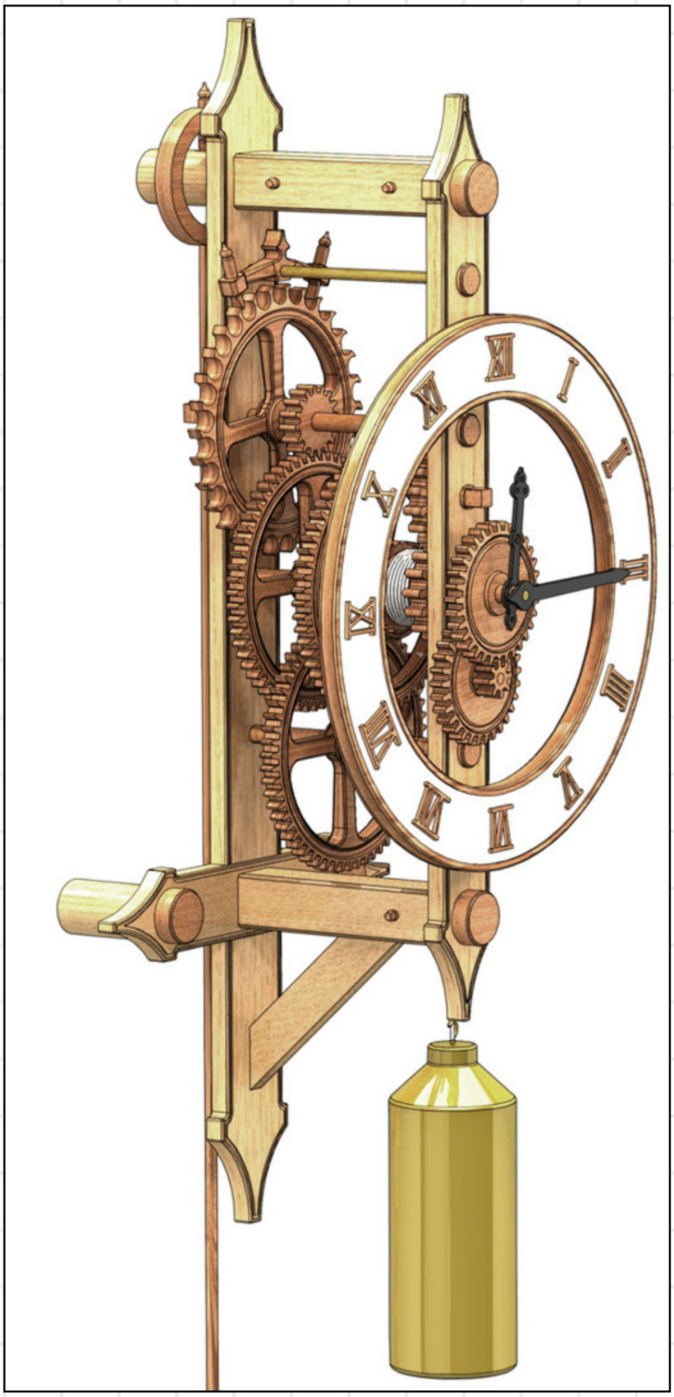
www.woodenclocks.co.uk

Introduction



I started to design wooden clocks back in 1980 when I was a designer at Burgess Power tools, at the time we were introducing a new version of the Burgess Bandsaw that needed a project to stimulate interest in the new machine. A wooden clock was thought to be an excellent vehicle to do this, and as the only company selling clock plans at that time wouldn't allow us to use their design for marketing the Bandsaw, it was decided to build our own and print the plans to give away with the new machine. That was such a great project to do and worked so well it sparked my interest in the subject.

It took many years to get back to the project though and finally try my hand at building a clock for myself, Clock one was the result of that, shown below on the left.



It was built using a Bandsaw to cut out all the parts and a sanding belt used in place of the toothed blade to sand all the tooth profiles. After a couple of months of trial and error, it started to work and so that started me off to think about other projects. However I never really got around to designing clocks again until I came up to retire, and then I had more time to spend on it.

Initially, I tried to keep all the designs strictly wooden and all driven by a hanging weight but eventually you have to experiment so now I have a mixture of clocks even some completely made from plastic and a few using a metal mainspring to drive the gear train. These experiments led to trying new types of escapement and even developing one of my own in the Woodenclocks gravity escapement.

So now it's time to pass on some of my experiences of designing and building wooden clocks, this book attempts to do that by initially looking at what actually makes up a wooden clock and what are the most important features that need to be there to make the clock actually work and be accurate in telling the time.

The Book is in three sections, the first being an introduction to each of the main sub-assemblies that go into the complete clock. The second is the instructions for building the Starter clock, the drawings for which are included with this book. Thirdly a section of Hints and Tips related to Designing and building a wooden clock.

All illustrations in this book are taken from the designs for Brian Law's Woodenclock's

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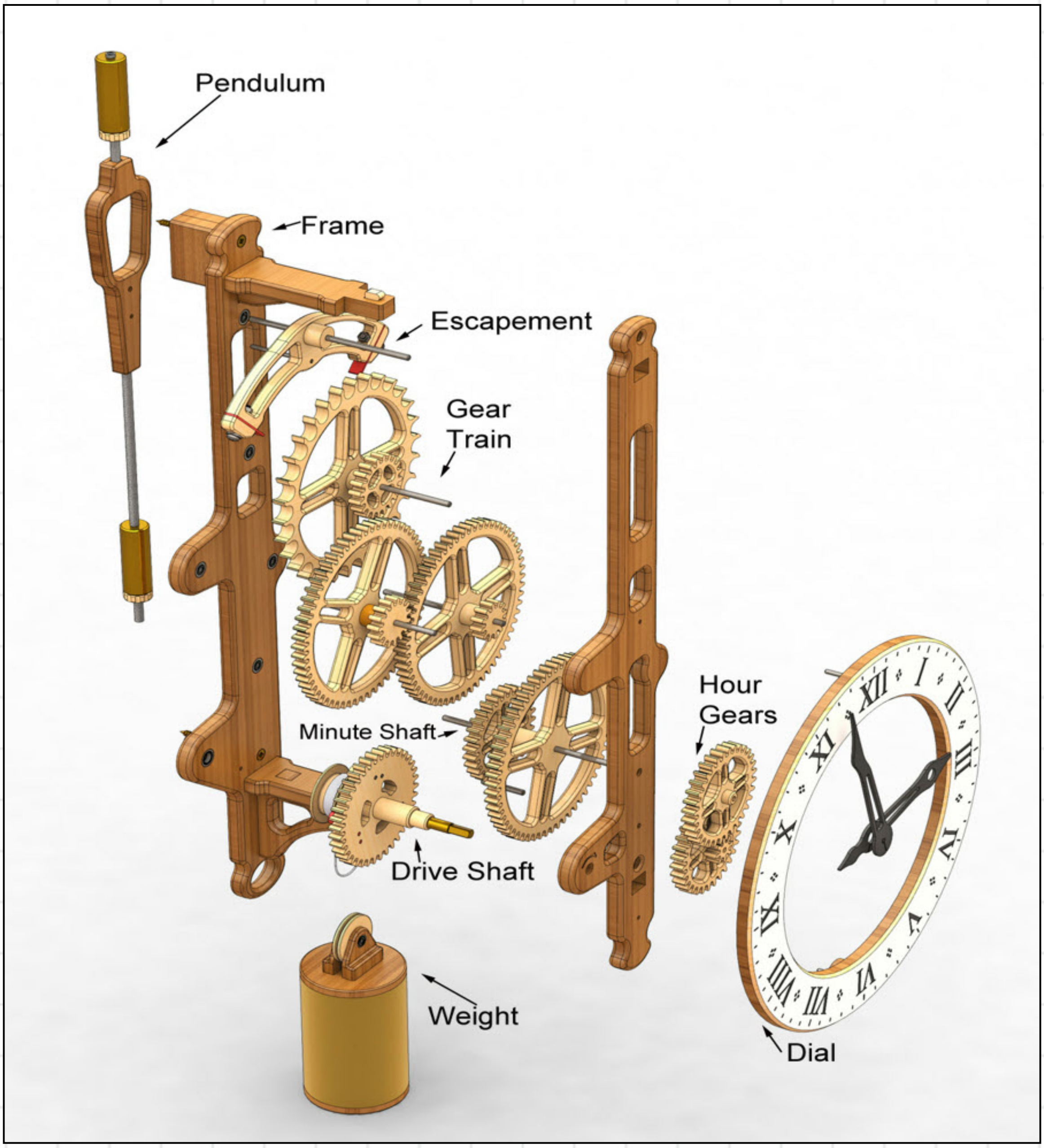
What makes the clock work



Any clock consists of several inter-related sub-assemblies that work together to turn the hands so you can tell the time.

It all starts with power that is going to drive the clock whether it is a weight or spring or even an electric motor, all are contenders, but using an electric motor is something I have never explored, so I have to leave that to others to pursue.

Next comes the gear train and how it has to drive both the hands and the Escapement as the two of them are connected.

The Escapement has the one biggest jobs of all as it slices up the movement of the gear train into small increments of time.

The Pendulum that controls the rate at which the Escapement can move, and it is this that defines how accurate the clock is going to run.

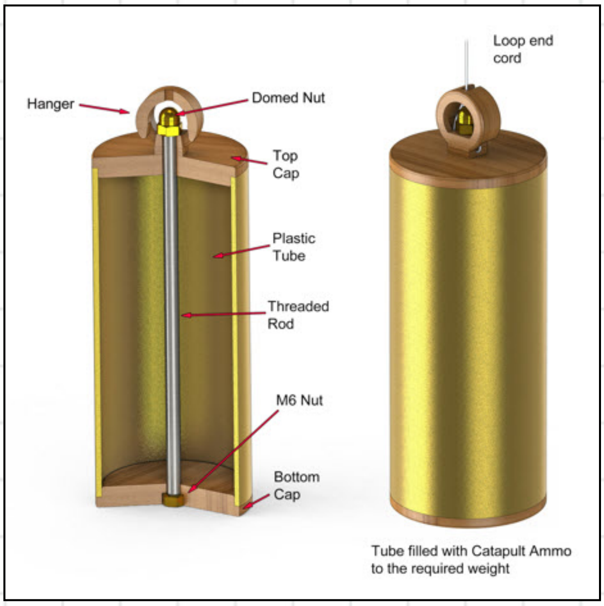
The Frame supports all the other parts as well as holding them in just the right position so that they all work freely together with the minimum of friction.

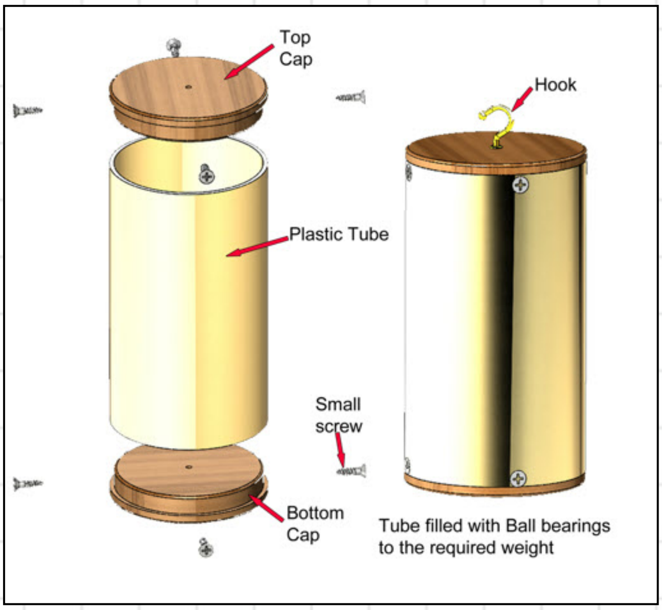
So, let’s have a look at these features in more detail.

The Clocks Power source

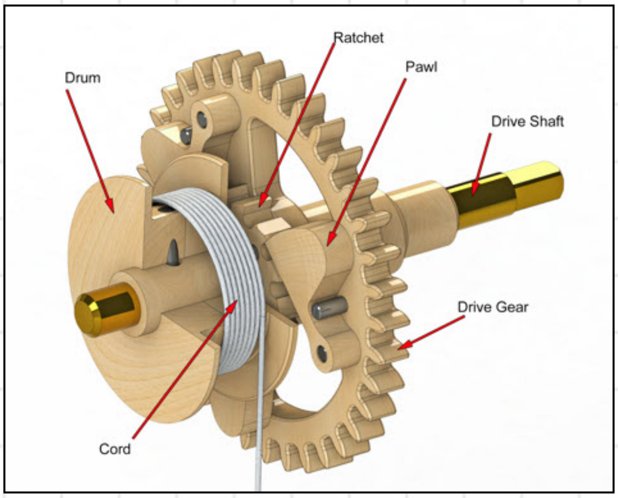
The Weight

This is nearly always going to be a weight hanging by a cord wrapped around a Drum that is connected to the first gear in the gear train. This in itself is not particularly complicated because you can use anything as a weight, I actually used a lump of Granite on my first clock just because it was handy and was around the right weight required. I have also used Coke bottles filled with water and Drain pipes filled with Ball bearings.





The only complication arises when you need to wind the weight back up after it has reached the ground so you can keep the clock running, this is usually a Ratchet of some type that allows the drum to be wound backwards while the gear train is held at rest.



The drive shown on the left is a more complicated Gravity ratchet using three pawls that always have the one able to fall into place under gravity and engage the Ratchet. This is the easiest to use in practice but the most complex to build.

In contrast, the arrangement shown to the right is much simpler with the weight hanging on the cord closest to the camera and a Counterweight at the rear. The cord is wrapped around the drum 1.5 times so that it grips the drum and turns the gear train and its wound by lifting both cords and shuffling them back and forth until the cord is at the top again.

The Clocks Power source - continued

Establishing the weight to use for the main clock weight, is done initially by trial and error. Each clock build is different and that has an affect on the size of weight to use. I normally use a two litre Coke bottle partly filled with water to start and add or remove water to get the clock running continuously.

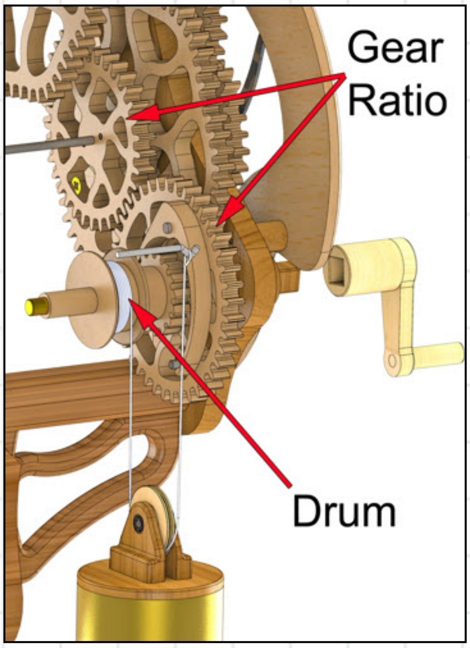
You would do this after setting up the clock and making sure everything is running freely and the escapement is set up correctly. Usually, a bit of back and forth here to adjust the escapement then adjust the weight. Having established the weight needed you can then construct your actual weight using the approach shown earlier or indeed one to your own design. The best approach to the design of the weight is to choose an approach that has a hollow shell that can be filled with Lead shot or Catapult Ammo (ball bearings) either of these are dense material that can be added incrementally to give you the weight you require.

Clocks with a ratchet arrangement use a key to wind the weight up using the cord wrapped around the drum, Most of my clock designs use a key for this purpose the winder design is either detailed on the design drawings or as often for the later clocks I recommend purchasing a standard Grandfather Clock key number 13. This suits the 5.5 mm Square cut onto the end of the drive shafts.

Clocks with a wrap-around arrangement of the cord on the Barrel is a bit more tricky to wind, I use this technique, with the counterweight to the left looking at the front of the clock, I hold that cord in my left hand and the main weight cord in my right hand both near the top. Slightly lift both cords and slide cords up and down a bit to unlock them from the drum, then with the left hand pushed to the back and the right hand pulled to the front, gradually pull down on the counterweight whiles slightly supporting the main weight, shuffle hands up and down repeating this until you complete the wind.

Run Time

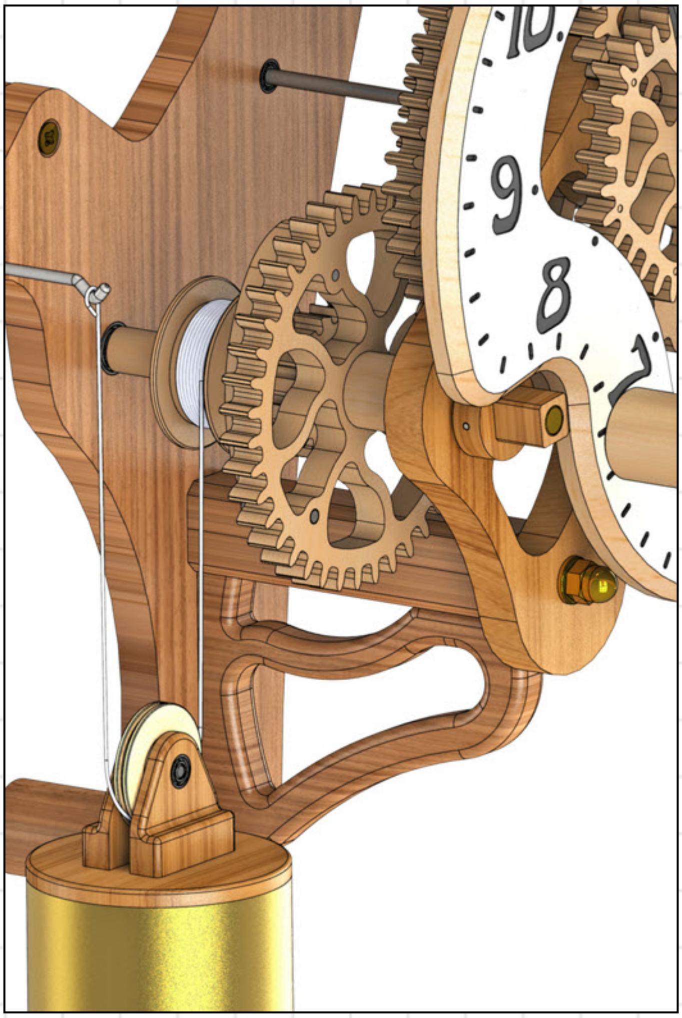
A word about the clocks run time now as this is not set in stone for my clock designs, you can increase the run time in several ways. The first way is simply to mount the clock higher up the wall, the higher it is the longer it will run, I like to start with the centre of the Dial set at around 1500 mm from the floor, the benefit of this approach is that it does not increase the size of the weight needed to run the clock.



The second way is to reduce the size of the drum around which the cord is wrapped, the increase in run time is proportional to the change in diameter of the drum, the smaller the drum the longer it will run, but the weight needs to be increased by the same proportion, this is the case for all the following changes.

The next involves changing the ratio of the gears on the driving shaft and the gear on the Minute shaft, the bigger the gear on the driving shaft relative to its mating gear on the Minute shaft the longer the clock will run.

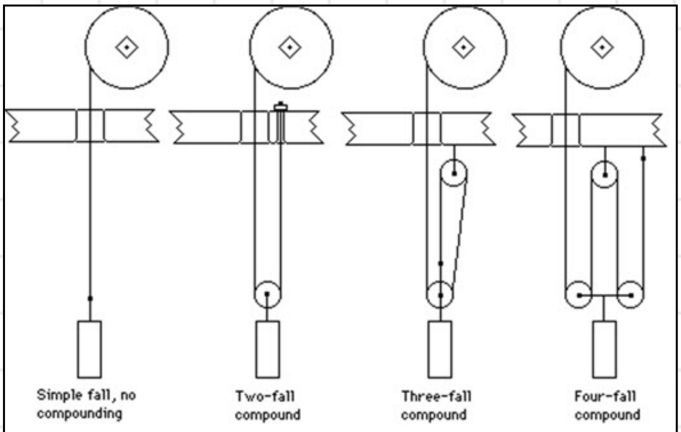
The clocks Power source - Continued



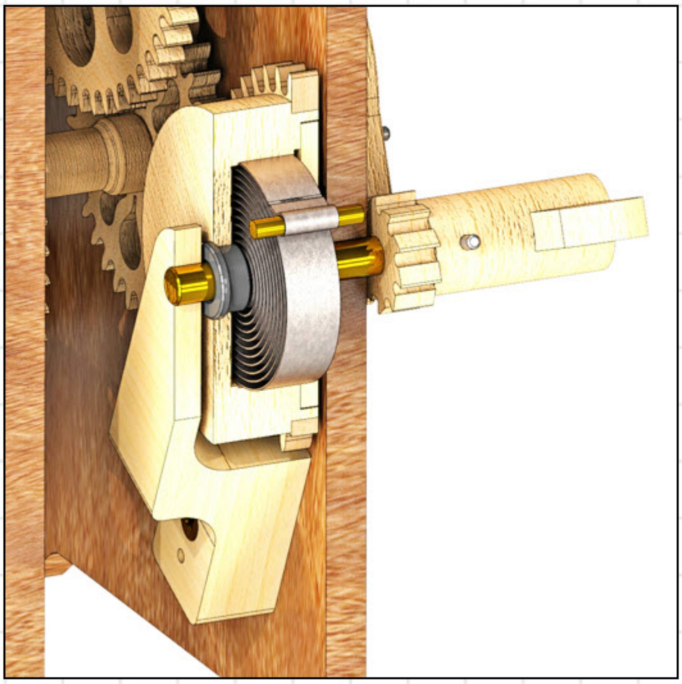
The biggest change can be achieved by adding pulleys to the weight, this example shows a simple pulley system used on Clock 23, this will double the run time of the clock and also double the weight required to run the clock.

With this simple pulley arrangement, you will get 2:1 Mechanical advantage, with the fixed end of the cord attached to the hook anchored in the clocks back frame. You can add more pulleys a shown below to get a greater mechanical advantage.

However, as you add more and more weight to the system you stand much more chance of distorting the clocks frame so it is recommended that you change the anchor point to the wall at the side of the clock.



Effective forces equal the weight (W) divided by the number of falls.



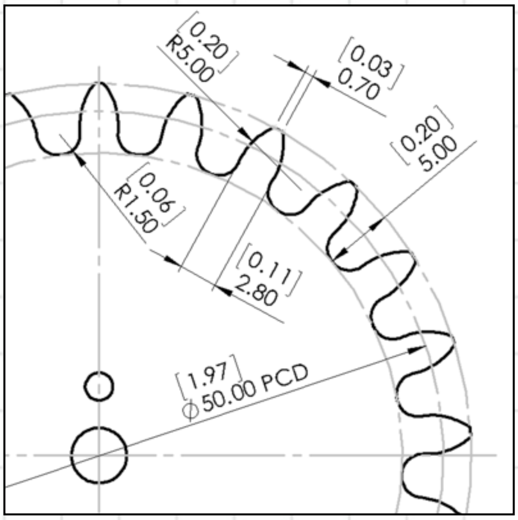
The other main source of power for driving a clock is, of course, the Mainspring, I have several clock designs that use the mainsprings like the one shown, which is called a American Ansonia with a rivet looped end, it can be easy to fit into a clock design. They are compact and come in several sizes to suit the load requirements of wooden clock design. I dislike using them as they can easily cause injury and damage if mishandled and allowed to unwind in an uncontrolled manner, my clock 14 suffered considerable damage when the spring was let loose accidentally. Having said that, they do provide a compact source of power for the clock.

The Clocks Gear Train - A bit more about the gears

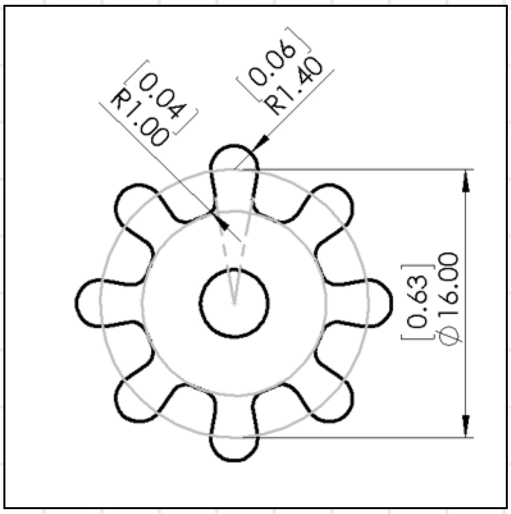
The gear teeth themselves are non-standard in form as they have been developed over time so that they have more working clearance than a standard gear design. This is to make it easier to cut and allow much more tolerance to the shape of the gear profiles when cut by hand in wood.

I normally use 2 types of gears for the clocks that I build, the main gears shown on the left below and the Pinions shown on the right. The pinions are the driven gears in the main gear train and have the rounded tops with the flanks of the gear project back to the centre of the gear. Gears up to around 12 teeth would normally be drawn as Pinions with the radius of the top equal to half the tooth width, the tooth width being the same as a gear.

Gear 25 teeth Mod 2



Pinion 8 Teeth Mod 2



The chart shown below is an Excel file that can be accessed by clicking on it, you can use it to calculate the profile dimensions for the gears that you design for your own clocks. The green areas hold dimensions that you can change the orange areas are calculated. The chart only shows a single gear and a single Pinion for four Mod values, you can change these to suit your own needs and add more gears.

Gear tooth Profile Calculator All dimensions in mm

PCD is Number of Teeth x Mod
Outside Diameter is (Number of teeth+2) x Mod
Root Diameter is PCD-(Modx3)

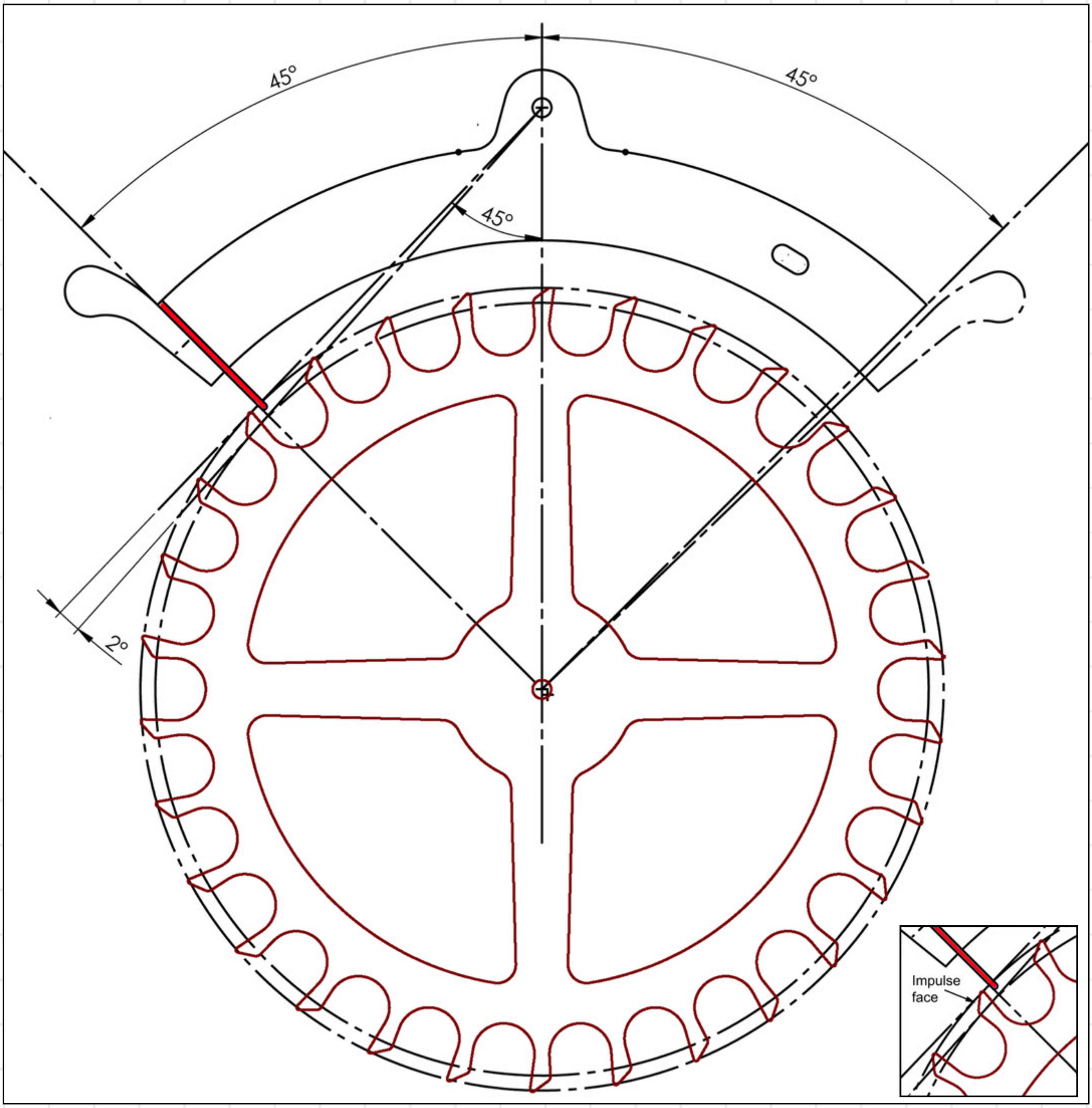
Calculation for Gear tooth Profiles

Mod	Number Teeth	Pitch circle Diameter	Outside Diameter	Root Diameter	Tooth Thickness	Root Radius	Tip Thickness
1	25	25	27	22	1.4	1	0.35
1.5	25	37.5	40.5	33	2.1	1.5	0.53
2	25	50	54	44	2.8	1.5	0.70
2.5	25	62.5	67.5	55	3.5	1.5	0.88

Calculation for Pinion tooth Profiles

					Tooth Rad		
1	8	8	N/A	5	0.7	1	N/A
1.5	8	12	N/A	7.5	1.05	1.5	N/A
2	8	16	N/A	10	1.4	1.5	N/A
2.5	8	20	N/A	12.5	1.75	1.5	N/A

The Clocks Gear Train - Laying out the Escapement



This is the layout for the escapement the leading face of the Pallets are positioned at 45° either side of the centre line. A circle circumscribes the extreme edge of the Escape wheel teeth. By drawing a line from the centre of the circumscribed circle at 45° to the vertical and then a second line perpendicular to this and tangential to the circumscribed circle, were this line crosses the vertical line is the Pivot Point for the Escapement. By drawing a second line from the pivot point at a 2° angle from the first and then drawing a second circle from the Escape wheel pivot tangential to that line, the gap between the two circles defines the extent of the top face of the Escape wheel tooth. This is the amount that the escape wheel will push on the Pallet to give an impulse to the pendulum. The Pallet should extend about halfway between the two circles.

This design is based on the Graham Escapement but it has been reversed so the teeth on the wheel can be made more substantial to avoid breaking in use.

The Clock Escapement - continued

Pinwheel Escapement

Invented around 1741 by Louis Amant, this version of a deadbeat escapement can be made rugged. Instead of using teeth, the escape wheel has round pins that are stopped and released by a scissors-like anchor. In the version shown here with 30 pins on the wheel, it will actually rotate twice as fast as a Graham Deadbeat escapement which means a longer pendulum needs to be used to slow the beat down. To get over this a Coup Perdu or ‘Lost Beat’ mechanism has been added to slow down the rotation of the Pinwheel to the rate achieved by the Graham escapement. You can see this in action in the video of the clock shown on YouTube.

The pendulum gets its impulse as the pendulum swings to the left, the pin that is resting on the underside of the catch pushes on the angled face of the catch to impulse the pendulum.

So, that it avoids doing this on the return swing, it has a pivoted catch that drops down at the end of the swing to the right, so on the return swing the catch is pushed closed so preventing a second impulse being passed onto the pendulum.

The Pendulum - Compound pendulum

Goal Seek

To enable you to more quickly adjust the values for length and or weight, Excel has a function called Goal Seek that zeros quickly in on a value that you are seeking. For instance, I require a value of two seconds for the period but it would take a lot of time to increment manually the value of H1 to achieve this so Goal Seek speeds up this process.

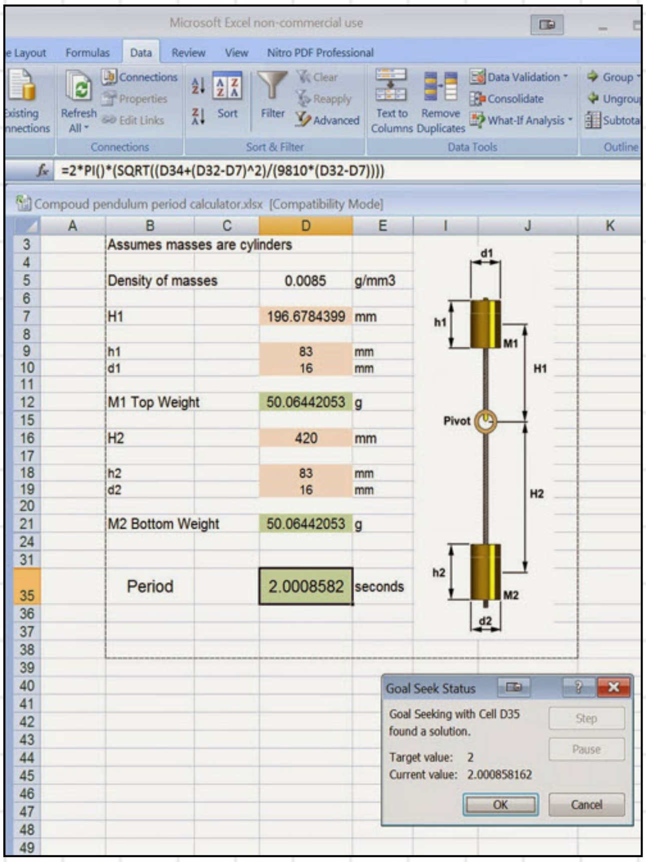
To get there go to the Data tab and click, then go to 'What - If Analysis' and then click on 'Goal Seek', that will bring up the screen shown to the right.

To fill out the Goal seek box first click on the 'Set cell' box and then click on the box containing the value for the Period.

Next, enter the value you want in seconds in the ' To value' box.

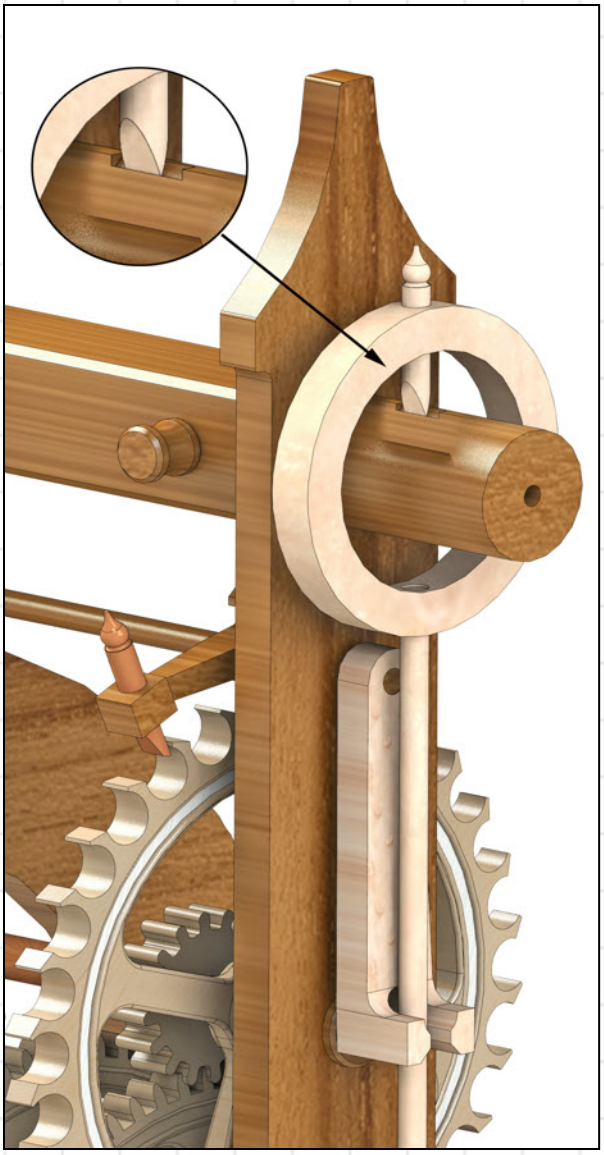
Now click on the 'By changing cell' and then click on the box containing the value for H1.

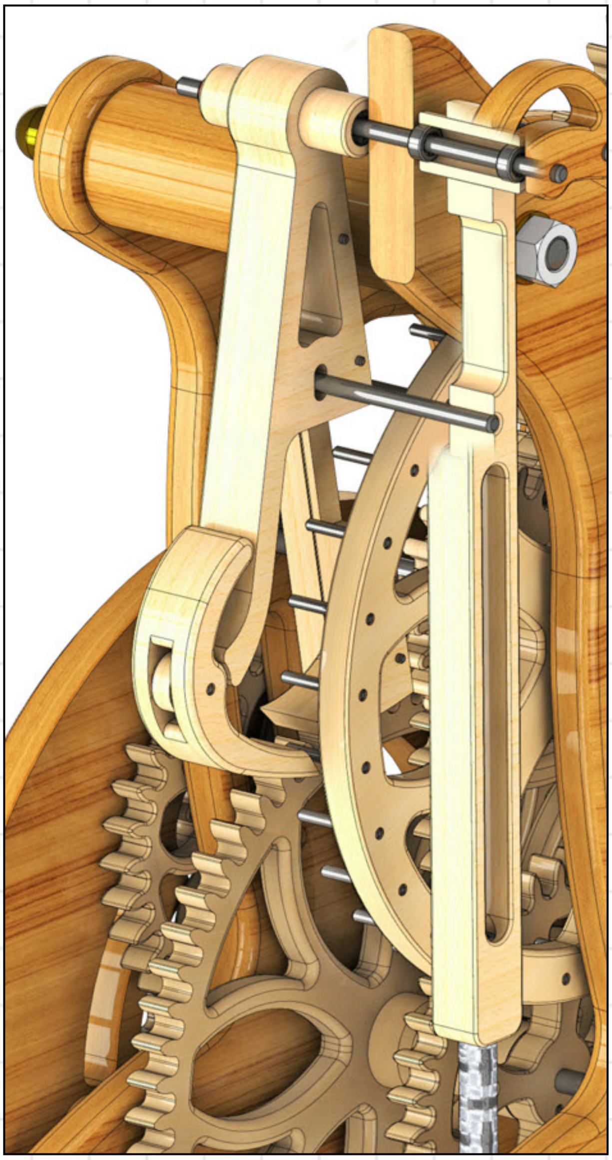
Finally, click OK and it will work out the value for H1. The result is shown above, the period is now very close to two seconds and the H1 dimension has been reduced to 196.6784399 to achieve it. You can do the same thing for H2 or the weights.



It seems to work better if you fix H2 and recalculate for H1 than the other way around.

Pendulum Construction - Heads





This is the traditional arrangement for the Pendulum Head, the pivot point is a 'Vee' shaped blade edge shown in the highlighted section above, nestling into a groove cut into the spigot protruding from the back of the frame. This arrangement has very little friction but unlike the visual shown here of Clock 1, the materials of both Vee and Groove should be metal to withstand the wear better.
The Escapement and the Pendulum pivot around separate points so to get them to move in unison the fork shown fitted to the Escapement shaft has the two arms extending backward to encompass the Pendulum Rod. The Pendulum should be free to move between the two arms but should be a close fit so there is the minimum of play between them.

This alternative design for the Pendulum head has a single pivot for both the Pendulum and the Escapement. It uses a long pin as shown above fixed firmly into the top of the frame and protruding backwards and forwards. Both the Pendulum and the Escapement are fitted with a roller bearing so that they can swing freely. They must of course act in unison so a pin fitted firmly into the front face of the Pendulum head extends forwards and fits into a vertical slot cut into the centre of the Escapement. This can be a tighter fit as no movement at all is expected, the only reason it is there is if there are any inaccuracies in the fitting of the pin that might distort to add friction to the bearing.

What will I need to build a wooden clock - hand tools

I shall start this list by saying that building a working wooden clock is not easy, it takes a lot of patience and a certain level of competence in the use of woodworking tools. If you don't have this then it may be best to work on a few less complex projects first to build some of the basic skills that you will need.

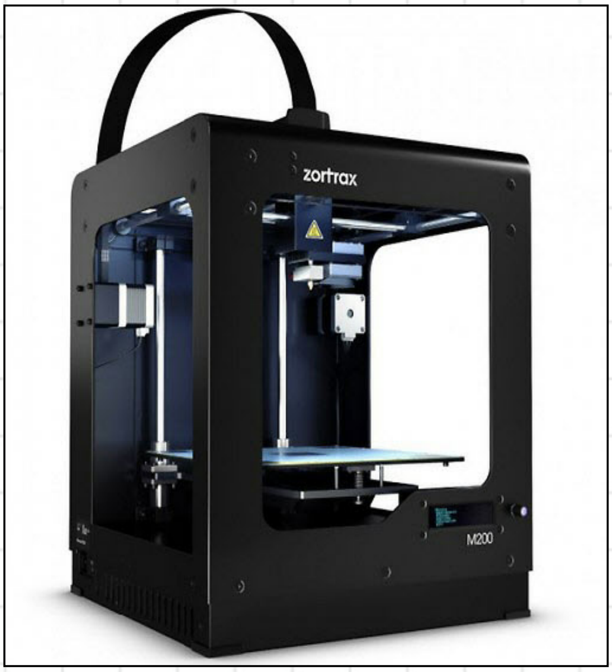
If you are an Engineer or Woodworker you will be fine, you already know that things will go wrong and you have a basic skill set that will enable you to work out the best solutions.

Having said all that, building a clock and getting it running gives a terrific buzz, so the project is well worth working at.

There will be many people coming to this project with some form of CNC machine in the workshop ready to start cutting wood, and that is a good start, but remember there are a lot of components in the clocks that can't be made on a CNC machine, round component, metal components and all manner of purchased items such as screws and pins. So I am going to start this list from the bottom upwards, there is a certain minimum level of equipment that you need to be able to make accurately the clock parts and then to assemble and problem solves the issues that arise.

First, the simple basic stuff, hand tools, the picture below shows what you will need to cover all the work that will need to be done by hand.

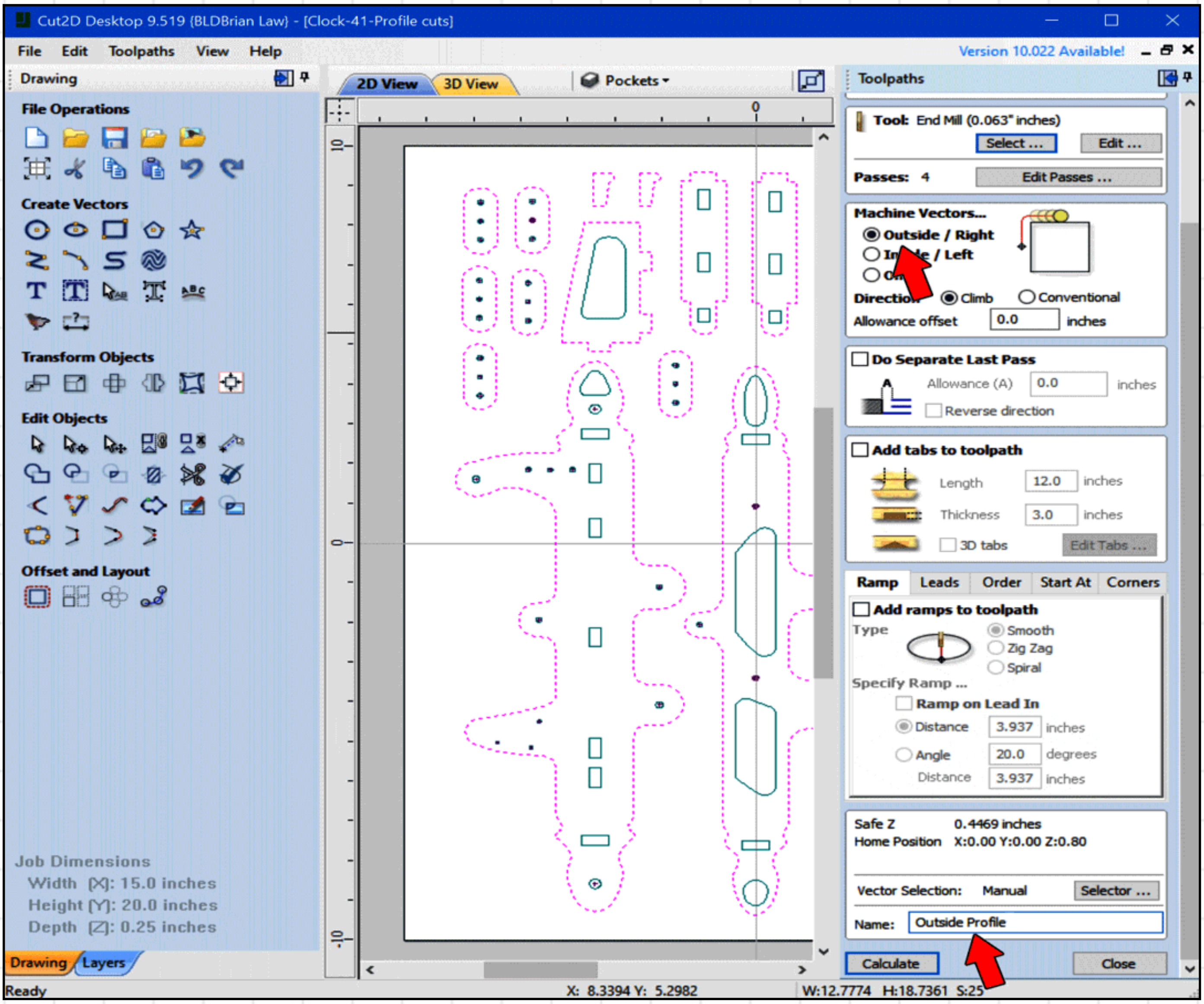
What will I need to build a wooden clock - 3D Printer.



Why would you need a 3D printer to build a wooden clock, well obviously you don’t, but they can be extremely useful if you intend to create your own clock designs. For instance, I use my 3D printer to produce prototype parts to develop the design I’m working on. The ideas for the clocks never appear to me in a fully finished form so the design has to be worked on by breaking down the concept into different areas that will interact with one another and try to work that out in 3D CAD and then pass the developing parts to the 3D printer to see how things are going to work in practice. This process is much quicker with printing as the parts emerge almost finished with no follow-up operations to remove burrs and apply finishes. It also saves on real wood as the development process can be wasteful on timber. This all leads to a fully developed design in a shorter time.

You could of, course, build the whole clock at a smaller scale as I have done with several of my designs.

Setting up the outside cuts



You are now ready to fill in the details for this outside profile cut, cutter size and cut depth remain the same, but the machine vectors are changed around to give you an Outside cut with Climb direction.

This time Tabs will need to be added so click on 'Add tabs to toolpath' and then 'Edit Tab' to send you to the Add Tabs box where you need to click on each position around the profile where you want to add a tab (see the small yellow boxes around the profile where I have added tabs). A word here about the need for tabs, I normally screw my blanks to the waste board with screws around the outside and some more towards the centre if possible to help keep the blank flat. When you cut out a profile you need to ensure that the part cannot move on the final cut through, so it is wise to add these tabs around the outside to stop any movement of the part before the cutting is finished. Once finished adding tabs close the edit tab window. You can now add a name to the toolpath and click on Calculate to create the toolpath itself.

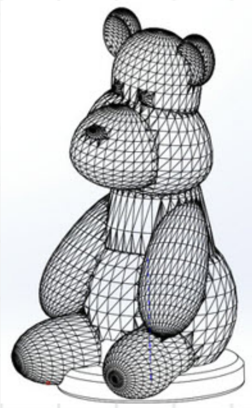
Making parts using a 3D printer

I have been using 3D Printing to produce parts for the clock prototypes I build, it started with Clock 35 which I had designed for my Grandson. I wanted it to be a fun colourful clock suitable for a young child or nursery, and the ability to print in a variety of colours was a real bonus as it meant that there was a need to paint the gear teeth and possibly compromise the running of the clock. It turned out to be an excellent way to prototype parts as the turnaround for each iteration of the design was not only quicker as there was so little in the way of finishing that needed to be done but it also freed me to do other things as I was not tied to the machine whilst it was running as I was when CNC machining.

To be honest, it is not so good with the larger frame parts as they have to be split into parts to fit the smaller table, but this was OK because I could still use wood for the frame and cut it on the router.

3D printing also produces 3D components that would be more difficult to make using 2D cutting on the router, these would normally be produced in layers to enable the 3D features to be made. An example of the is the Escapement lever in Clock 37, simple to 3D print but more laborious to make by CNC machining.

This is probably the easiest way to make your clock as it is almost a one-step process, I would normally finish the parts by trimming off any supports and making sure there were no unwanted little blobs or strings of plastic. Then drill all the precision holes for the pins and shafts to be fitted, and then on to the final assembly for tweaking the set up to get the clock running to time.



The files needed for printing are STL files, these are 3D files and comprise small triangular sections, laced together to form the shape of the object being modelled. Teddy shown here is an example of how an STL looks, with course triangles like these they can be seen in the finished model but models can be saved with very much smaller triangles so the finish is a lot smoother. However as with everything else the more detail means a lot bigger file.

STL files can be created from the STP files I include with all my clocks, using on-line translators you to build any of my clocks in this way. I actually have 4 smaller clocks designed specifically for 3D printing and come with the STL files and Clock 37 the last clock also has STL files the rest you would need to translate from the STP files.

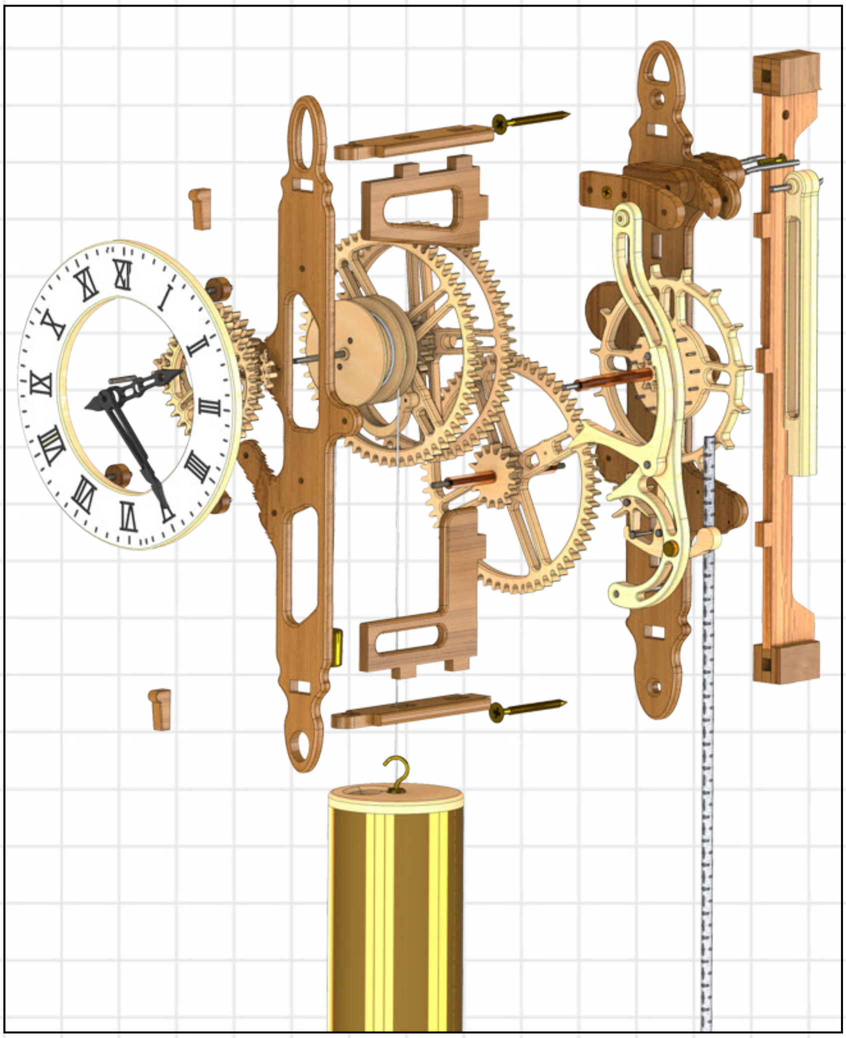
If you have a 3D printer you almost certainly have the software you need to use the STL files that I have provided so I will not include any Step by Step instructions here, however, if you want to learn more about STL files and 3D printing, in general, go here.

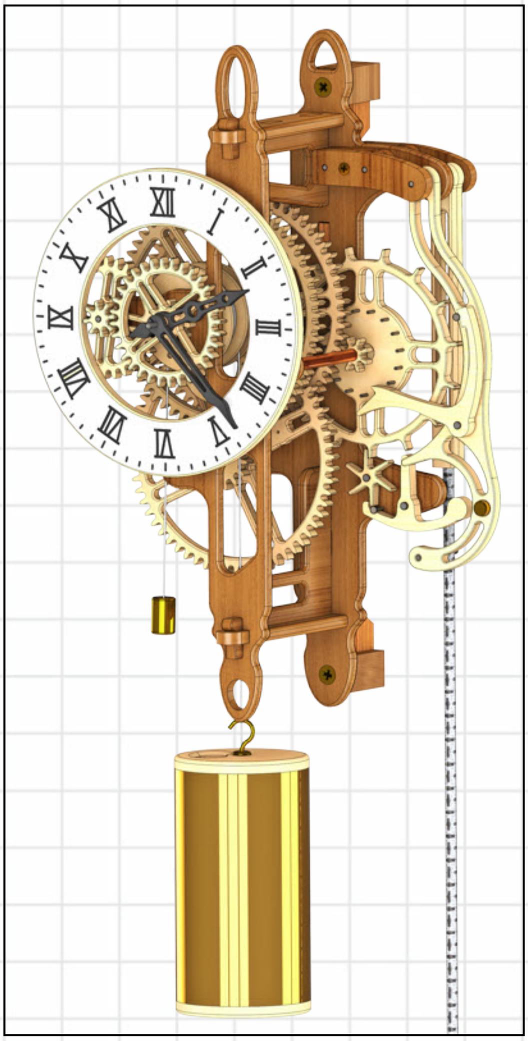
I have included all of the STL files for you to download on the download page 61. There has been some modification to the files to enable you to print the longer items like the Frames and the Rear Frame stiffener these have been split into several sections to enable you to do the printing on the normal-sized table. Other items like the gears have the spacers incorporated to simplify the build. Other than those changes the rest have been translated to STL files direct.

Assembly - Parts assembly

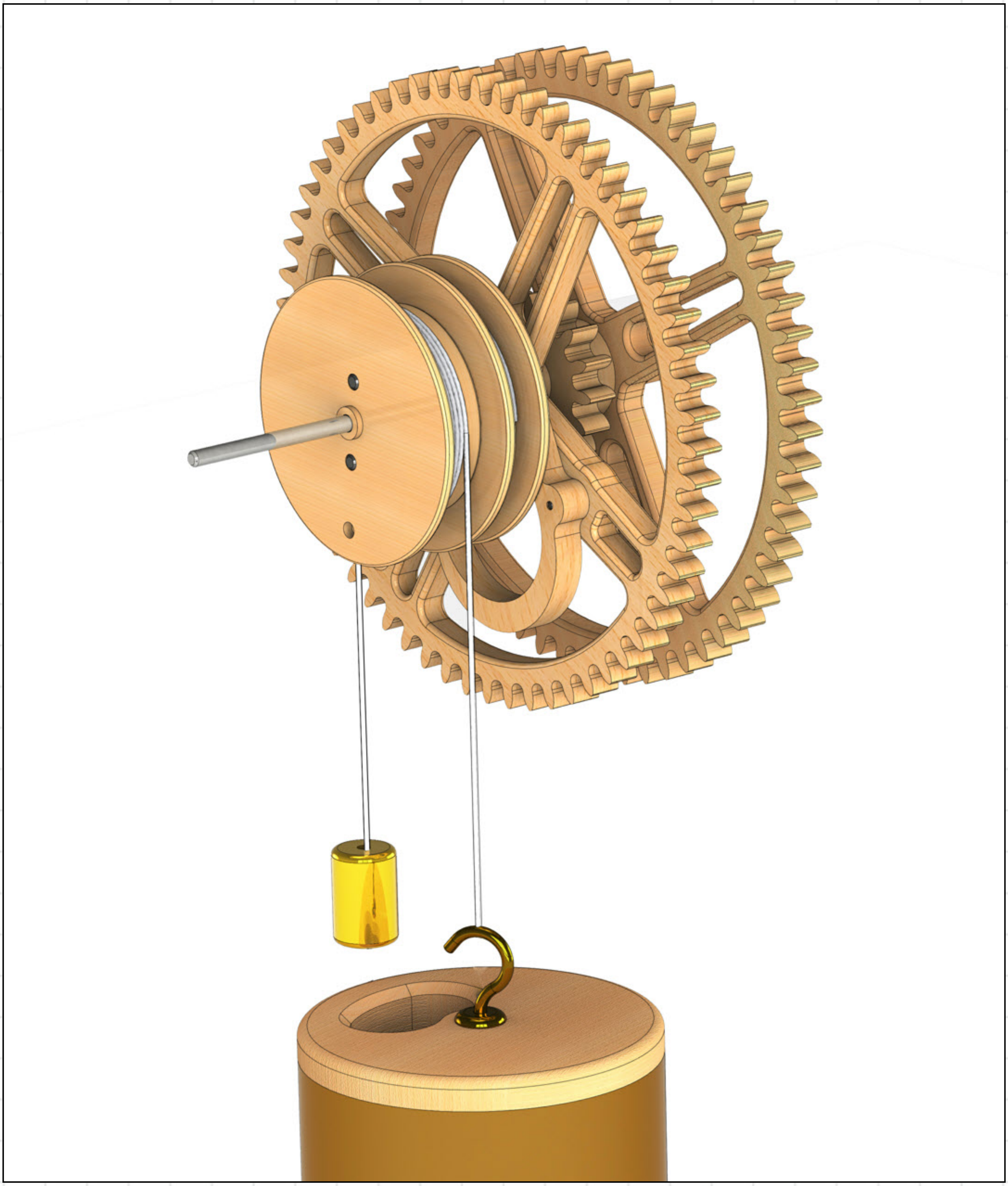
OK, so you have spent some considerable time making, cutting out and finishing all the parts for the clock, no matter which method you used to cut them out you are now ready to assemble the clock.

Before you actually start to put the parts together make sure you are familiar with all the details of the design. Go through the detail drawings and all the rendered illustrations with their cutaway views carefully to note things like which way around the Escape wheel fits on the shaft, Most important, which way round the ratchet is fixed to the drum and which way Pull cord and the weight cord are fitted to the drum. It is details such as these that determine whether the clock is going to work or not. The steps are illustrated on the following pages so it is worth making yourself familiar with the whole process before you actually start.



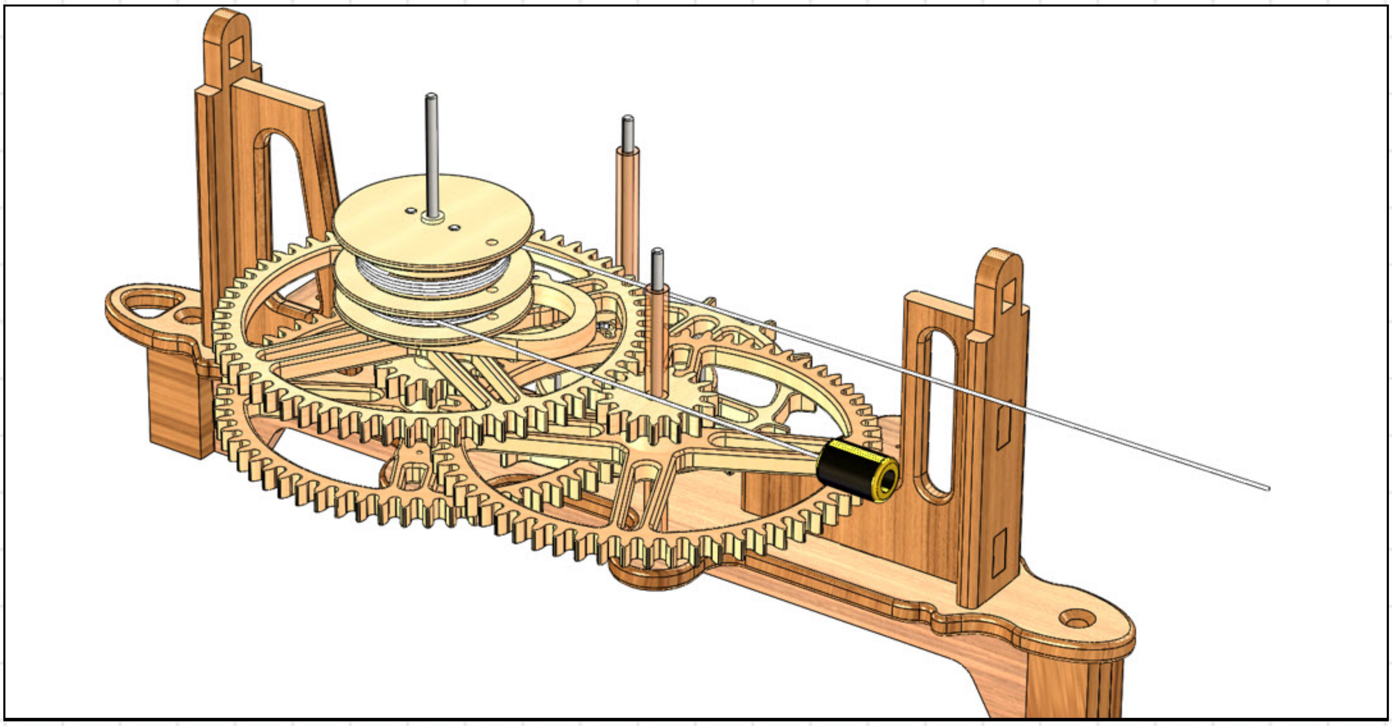


Assembly - Drive gear assembly- continued

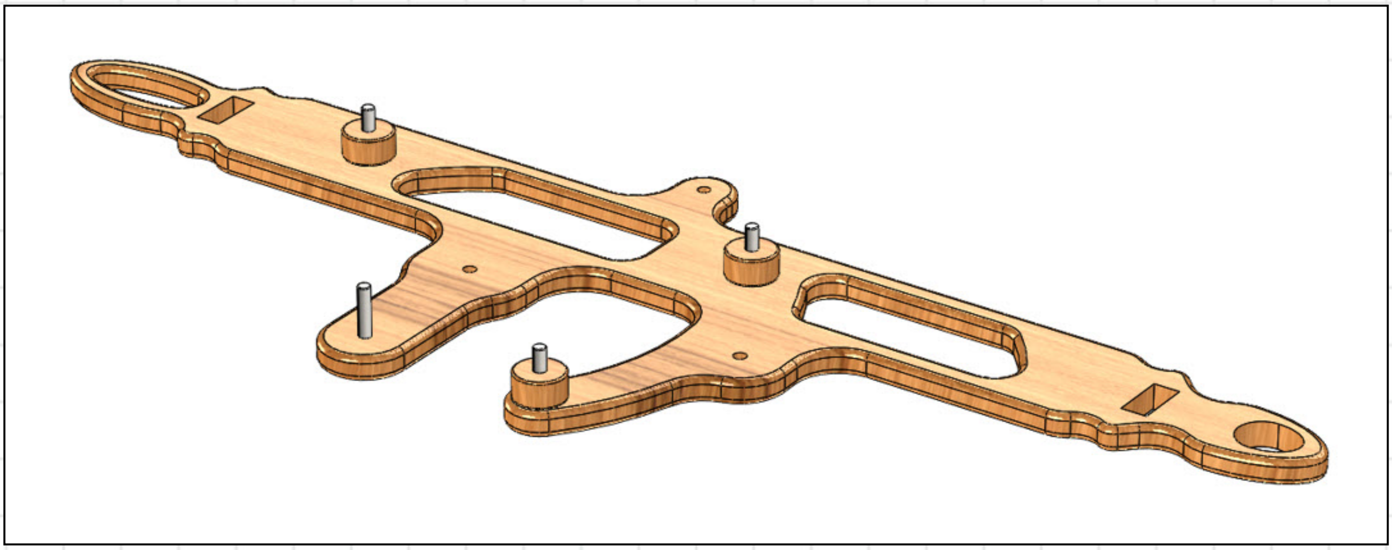


Time to fit the cords to the Drum cut a length of Cord four meters long. Thread the cord through the outer hole in the central spacer and pull half the cord through. The cord that holds the Weight should be wrapped around five times in a Clock-wise direction so the cord hangs down to the Right of the Drum, tie a Bowline knot in the end to hold the weight. The other cord which is to rewind the clock is wound fully onto the drum in an anti-Clock-wise direction with the cord hanging down to the left about 150 mm. Attach the Pull Cord Toggle to this end.

Assembly - Drive Train- Continued

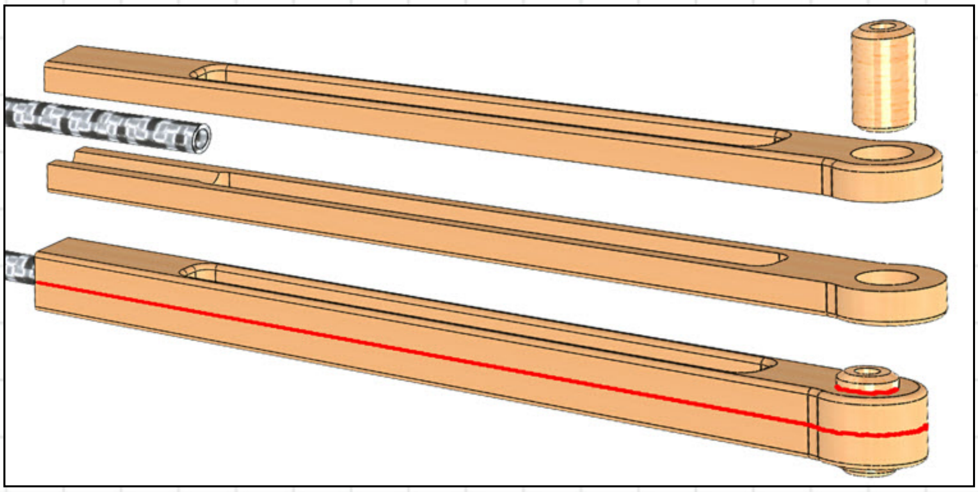


Fit the final Gear sub-assembly in place and carry out the checks as before. It would be helpful at this point to temporarily tape the two cords to the 60 tooth gear as they have a tendency to both unwind and cross over.

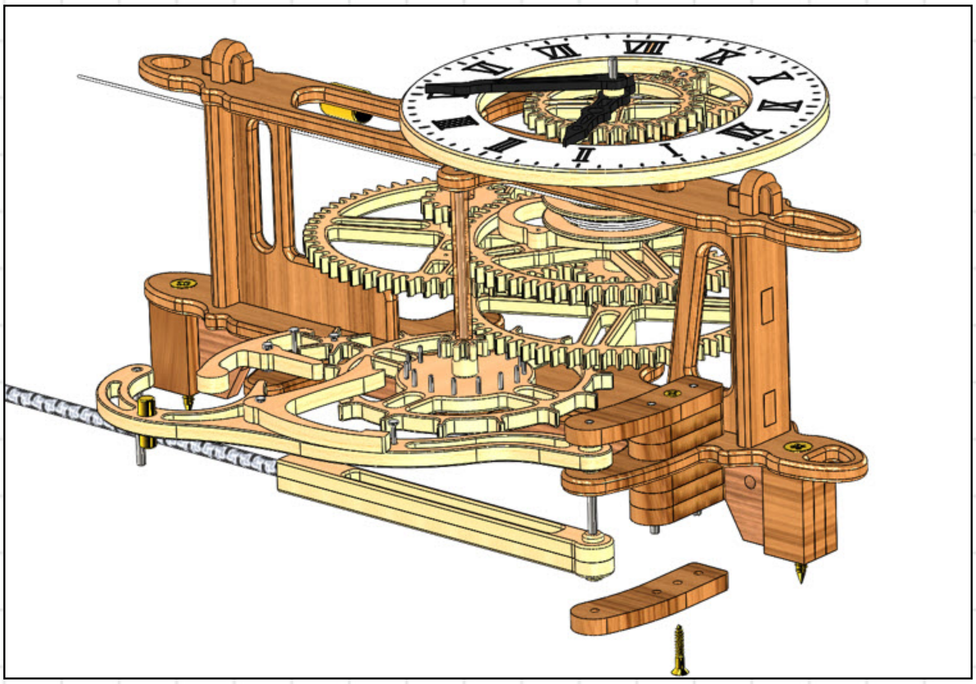


Before fitting the Front Frame the pins that are used to hold the Dials in place, and the Pivot for the Hour gears should be fitted into place, then you can fit the Front Frame onto the top of the Frame spacers and lock in place using the Wedges.

Assembly - Pendulum Assembly

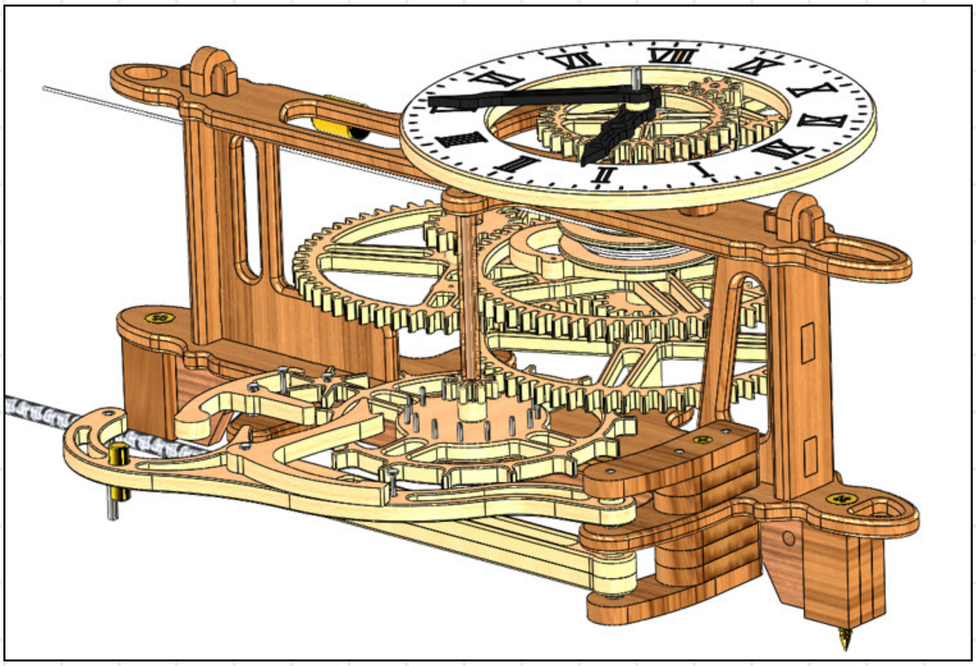


Apply glue to inside surfaces of the Pendulum head and around the Bush and the Pendulum Rod then assemble all parts.



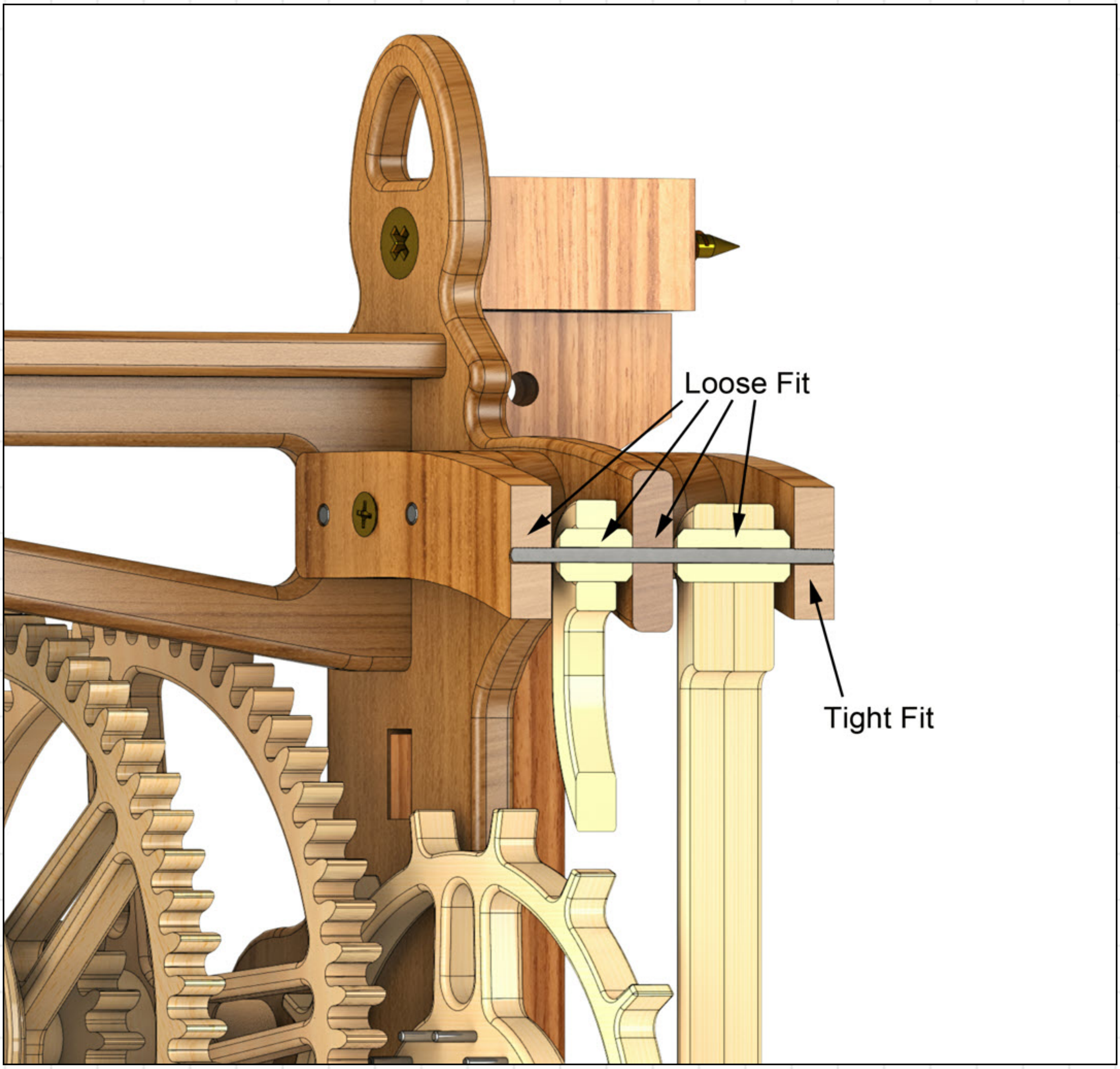
When dry, fit the Pendulum Head onto the Pivot pin from the backside of the Back frame as shown here.

Then fit the Pendulum support and secure in position with a small brass screw.



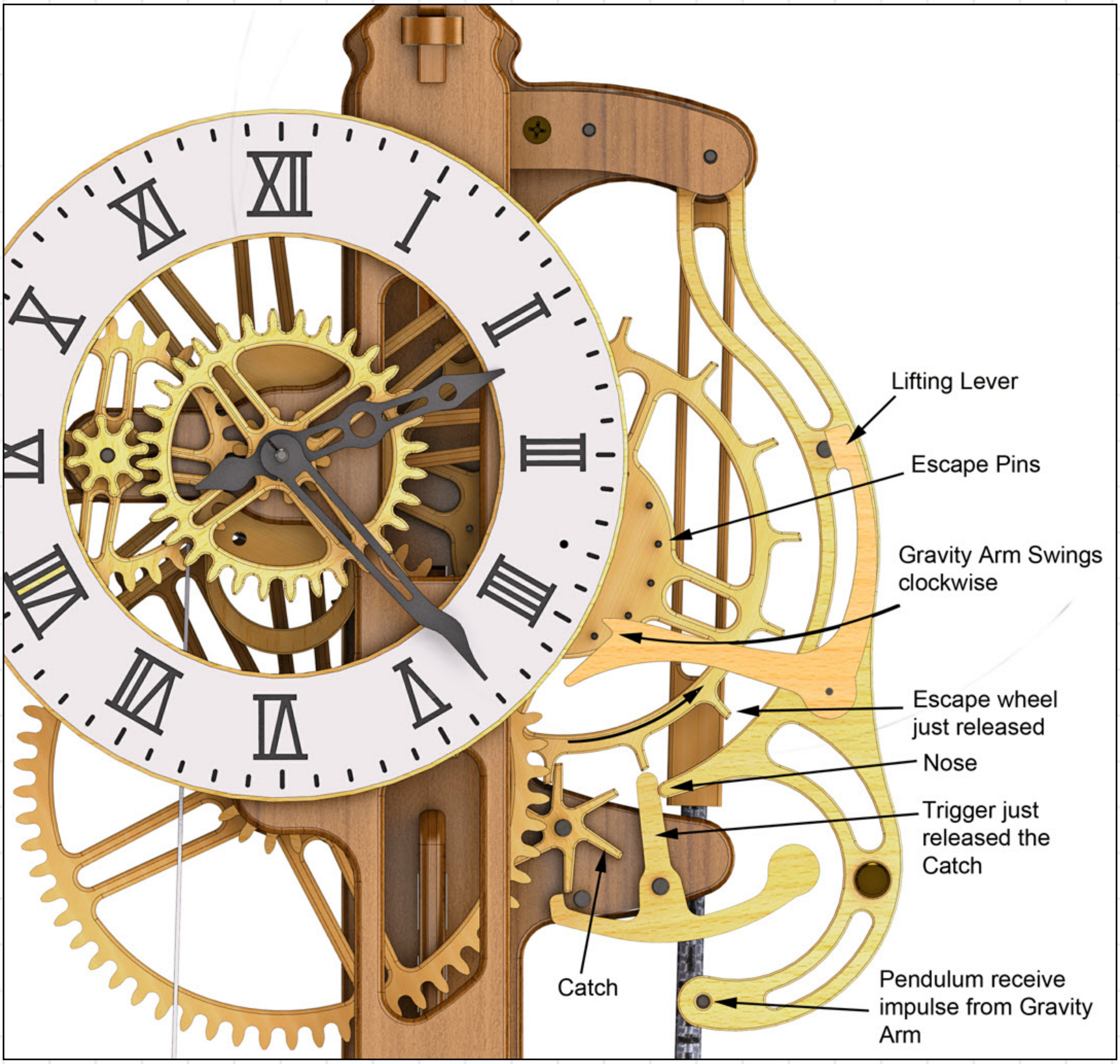
The clock is now ready to be mounted to the wall. I would suggest you mount it so the centre of the dial is 60 inches from the floor, this should give a running time of around 8 Hours.

Assembly - Escapement and Pendulum



Cross-section through the Pendulum and Gravity Arm Pivots showing the fit types required. The Pivot pin fitted into the Rear Pendulum Support is the only one that needs to be a tight fit, all the others are a smooth running fit running. Also, note the Chamfers on the two bushes in the ends of the Pendulum and Gravity Arms, these are there to reduce the surface area that can rub on the Support side faces so reducing friction.

Assembly - Testing the operation of the Gravity Escapement



The illustration above catches the moment when the Pendulum is swinging to the left and being given an extra push from the gravity arm via its impulse pin.

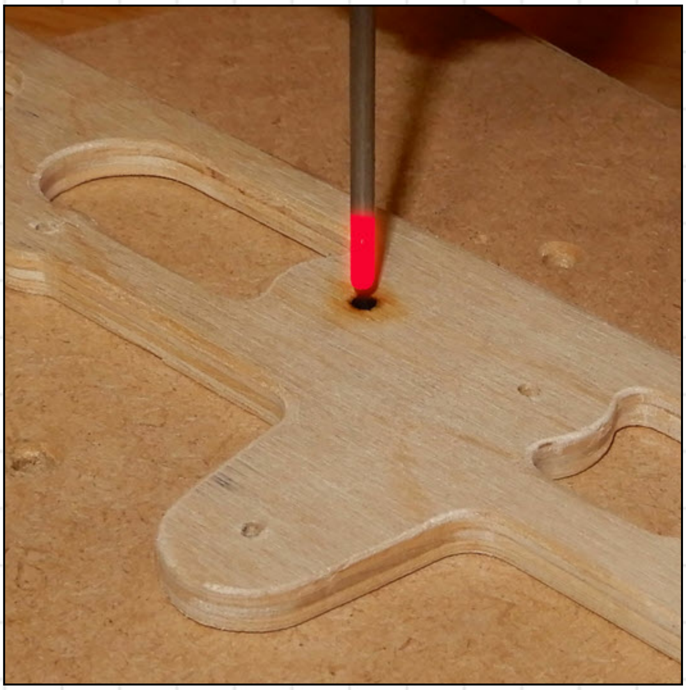
At this time you can see that the fork on the end of the is heading towards one of the Escape pins set into the Escape wheel, at this point, it has not quite reached the pin and this is important as the Trigger has only just released the Catch to allow the Escape Wheel to start moving. It needs to be moving before the Lifting Lever/Gravity Arm reaches the pin so that it can push the Gravity arm back after giving its impulse to the pendulum.

If your clock is not working you may need to make some adjustments in a few places if the Fork is not lining up with the Escape Pin then filing off some material or adding a little to the surface of the flat face at the top of the Lifting Lever where it contacts the Stop Pin, will lift or lower the Fork.

If the Fork is hitting the Escape Pin too soon and causing the Escapement to lock up then you need to add a little material to the Nose on the Gravity Arm, if it is releasing too soon you need to remove material from the Nose.

Tips and Tricks

Creating a bearing hole.



There are no bearings used in this clock so the shafts run on the bare wood of the drilled hole. I had noticed when making Clock 21 that using a laser to cut out all the profiles and holes left a burnt surface on all the parts cut this way. This, of course, was carbon which just like Graphite is a lubricant, so as this simple clock design does not use actual bearings, I have attempted to simulate the Laser cutting process by Burning the hole surface with a red hot Ø3 mm rod.

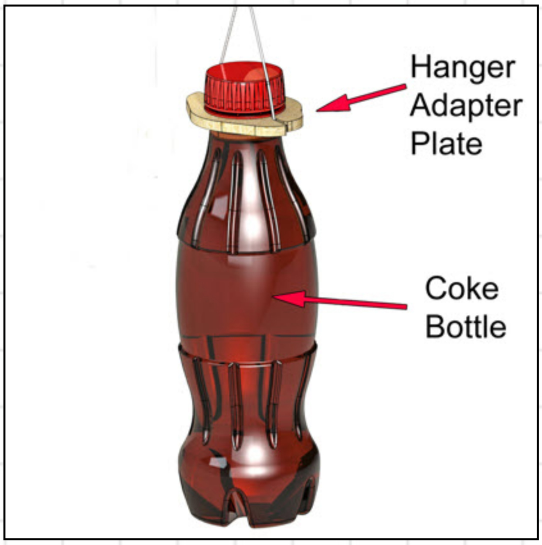
The two photos shown here illustrate the process, the Ø3 mm Rod is held in the drill chuck and then heated to red heat with a blow torch, at which point the front frame with the Ø3 mm holes already drilled is placed on the baseboard below the glowing rod and then the rod slowly fed through the hole to burn its surface, and that's it. You now repeat the process for all the holes that will carry a rotating shaft in the front and back Frames.

I have tried this on the prototype built for this article and it does seem to have some merit, I haven't tested it over a long period of time nor have I run comparison tests with an assembly non-burnt holes but the results do seem encouraging so may be worth giving it a try.

The set up used here with a power drill mounted in a simple drill stand is the same set up that can be used for fitting the shafts into the gears illustrated earlier for assembling the gear sub-assemblies. If you don't own a bench drill or a small milling machine this is an excellent way of assembling the shafts at a minimal cost.

Tips and Tricks

To determine correct weight to use.

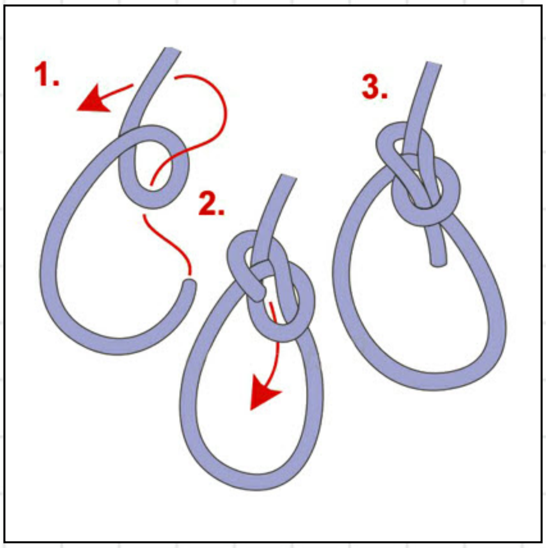


You can make the weight from whatever you like, ideally, it should complement the aesthetic of the clock and not look bizarre or incongruous. I favour the brass weight but this is not always practicable and can be expensive. I have used a granite block in the past and more recently used soft drink bottle or Can.

To determine what size weight to use to drive the clock, I normally use a two-litre Coke bottle partly, filled with water to start, and add or remove water to get the clock running continuously.

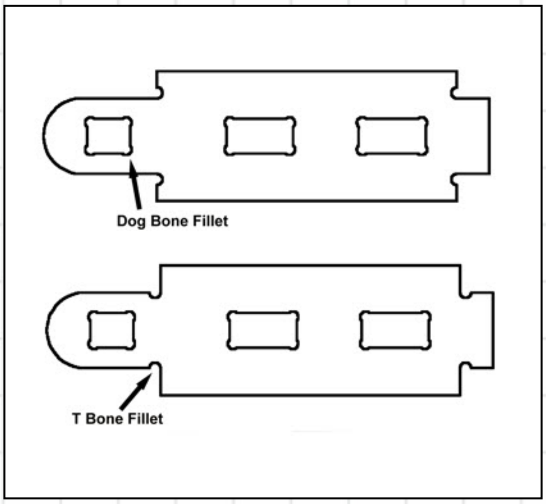
You would do this after assembling the clock and making sure everything is running freely and the escapement is set up correctly. Usually, a bit of back and forth here to adjust the escapement then adjust the weight. The Hanger adapter plate can be cut from 3 mm thick plastic or Plywood, get the DXF file here.

Bowline Knot



I always use a Bow Line Knot on the end of the cord holding the driving weight of a clock, it is one of the most useful knots you can know. The Bowline forms a secure loop that will not jam and is easy to tie and untie. The Bowline is most commonly used for forming a fixed loop, large or small at the end of a line. Tried and tested over centuries, this knot is reliable, strong and stable. Even after severe tension is applied it is easy to untie.

Types of Fillets



When cutting the profiles for parts that are to be fitted together then you are going to need to modify your profile cuts to overcome the problem of fitting square-cornered tabs into the round-cornered holes produced when the holes or slots are cut with a round router bit.

You can do this by modifying the fillet in the manner shown in the sketches to the left here, the holes use a 'Dog Bone' type which has the fillet formed at a diagonal to the corner where the original square corner is cleared out by the fillet whose circular edge just clears the corner. On the external cuts, the fillet is formed with its radius centre on the original cut line, it can be done in either direction as shown in these examples but for preference, I would use the upper example as it doesn't weaken the tab.

Brian Law's Woodenclocks list of clocks on site

	A	B	C	D	E	F	G	H	I	J
1	Brian Law's Woodenclocks - Feature list									
2										
3	Clock	Made From	units	Difficulty	longest	Pendulum	Weight	Run Time	Escapement	Clock
4					Part	Length		Aprox		
5										
6	1	Wood	mm	Medium	664 mm	990mm	3 kg	10 hrs	Graham	1
7	2	Wood	mm	Medium	430 mm	990mm	3 kg	10 hrs	Graham	2
8	3	Wood	inch	Medium	18.5 in		1.5 lbs	8hrs	Verge and Foliot	3
9	4	Wood	mm	Medium	406 mm		0.6 Kg	8hrs	Verge and Foliot	4
10	5	Wood	mm	Medium	476 mm	990mm	3 Kg	10 hrs	Graham	5
11	6	Wood	mm	Hard	1437 mm	990mm	3 Kg	8 hrs	Graham	6
12	7	Wood	inch	Medium	46 in	39 in	6.6 lbs	8hrs	Graham	7
13	8									8
14	9	Wood	mm	Hard	400 mm	250 mm	2 Kg	8hrs	Graham	9
15	10	Wood	inch	Medium	14.7 in	39 in	6.6 lbs	10hrs	Graham	10
16	11	Wood	mm	Medium	277 mm	990mm	4 Kg	8hrs	Graham	11
17	12	Wood	Both	Medium	330 mm	250 mm	Spring	8hrs	Graham	12
18	13 STL	Plastic	mm	Easy	275 mm	250 mm	1 lbs	10 hrs	Graham	13 STL
19	13 FDM	Plastic	mm	Easy	275 mm	250 mm	1 lbs	10 hrs	Graham	13 FDM
20	14	Wood	Both	Hard	315 mm	250 mm	Spring	8hrs	Graham	14
21	15	Wood	mm	Hard	430 mm	1330 mm	1.8 Kg	24 hrs P	Grasshopper	15
22	16	Wood	Both	Medium	391 mm	250 mm	Spring	8 hrs	Verge and Foliot	16
23	17	Wood	Both	Medium	345 mm	250 mm	Spring	8 hrs	Flying Pendulum	17
24	18	Wood	mm	Hard	530 mm	990 mm	1 Kg	24 hrs P	Graham	18
25	19	Plastic	mm	Medium	290 mm	990 mm	0.6 Kg	10 hrs	Graham	19
26	20	Wood	mm	Medium	690 mm	990mm	1 Kg	12.5 hrs	Gravity	20
27	21	Wood	mm	Easy	430 mm	990 mm	0.35 Kg	7 hrs	Graham	21
28	22	Wood	mm	Hard	455 mm	990 mm	2 Kg	24 hrs P	Gravity	22
29	23	Wood	mm	Hard	700 mm	990 mm	2.2 Kg	25 hrs P	Graham	23
30	24	Wood	inch	Hard	30 in	39 in	5 lbs	12 hrs	Gravity	24
31	25	Wood	inch	Easy	22.5 in	39 in	1.5 lbs	8 hrs	Graham	25
32	26	Wood	mm	V Hard	571 m	39 in	2.2 Kg	12 hrs	Gravity	26
33	27 FDM	Plastic	mm	Easy	190 mm	250 mm	0.6Kg	10 hrs	Graham	27 FDM
34	28 FDM	Plastic	mm	Easy	184 mm	250 mm	0.6Kg	10 hrs	Graham	28 FDM
35	29 FDM	Plastic	mm	Medium	190 mm	250 mm	0.6Kg	10 hrs	Gravity	29 FDM
36	30	Wood	mm	Easy	560 mm	990 mm	0.75Kg	8 hrs	Graham	30
37	31	Wood	mm	Easy	520 mm	990 mm	0.75 Kg	8 hrs	Graham	31
38	32	Wood	mm	Medium	570 mm	250 mm	2 Kg	25 hrs P	Graham	32
39	33	Wood	mm	V Hard	580 mm	150 mm	2.5 Kg	11 hrs	Graham	33
40	34	Wood	inch	Medium	15.5 in	39in	4 lbs	13 hrs	Gravity	34
41	35	Wood	mm	Hard	410 mm	250 mm	Spring	10 hrs	Graham	35
42	36	Wood	mm	Easy	330 mm	990 mm	1.3 Kg	24 hrs	Graham	36
43	37	Wood	mm	Hard	300 mm	990 mm	1 kg	hrs	Pinwheel	37
44	38	Wood	mm	Medium	534 mm	585 mm	1.2Kg	12 hrs	Grasshopper	38
45	Starter	Wood	mm	Easy	420 mm	990 mm	0.6Kg	8 hrs	Graham	Starter
46	40	Wood	mm	Medium	270mm	990 mm	1 kg	14 hrs	Galileo	40
47	Starter-in	wood	inches	Easy	13in	39in	1kg	8hrs	Gravity	Starter-in

The chart above contains details of all of the wooden clocks on the Woodenclock's web site, it gives all the clocks details so that you can more easily choose the clocks you are most interested in before [visiting the site](#).