

# Marble Machine No 1 Motorised Assembly Instructions





# Marble Machine No 1 Motorised Assembly Instructions

## Required for assembly:

Wood glue (PVA or aliphatic resin recommended) and/or Cyanoacrylate (CA) glue  
Clamps or weights, rubber bands  
Sandpaper  
Soldering iron, solder

### **Please note:**

It is recommended that you apply varnish or sealer to the finished marble machine, especially if you live in areas with high humidity. Polyurethane varnish is a good choice.

If you manage to drop some of the balls on the floor (inevitable!) then **DO NOT** be tempted to pick them up with a magnet. This can cause the balls to become magnetised and they will then stick together which will impair the operation of the marble machine.

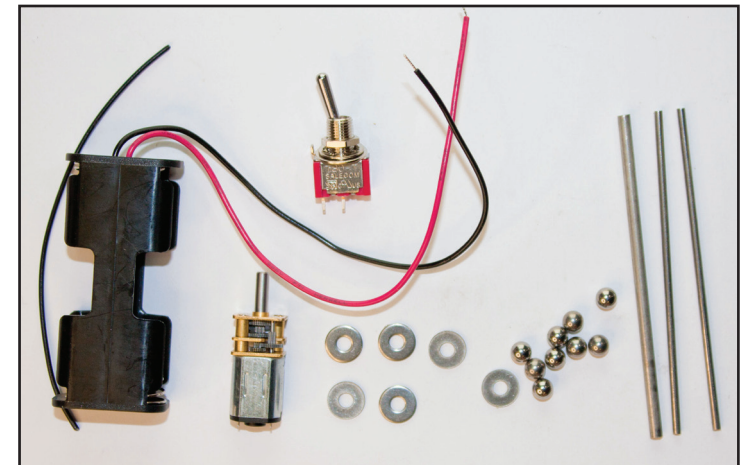
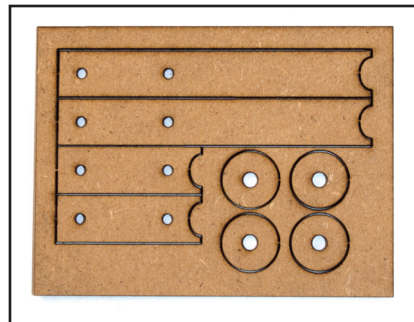
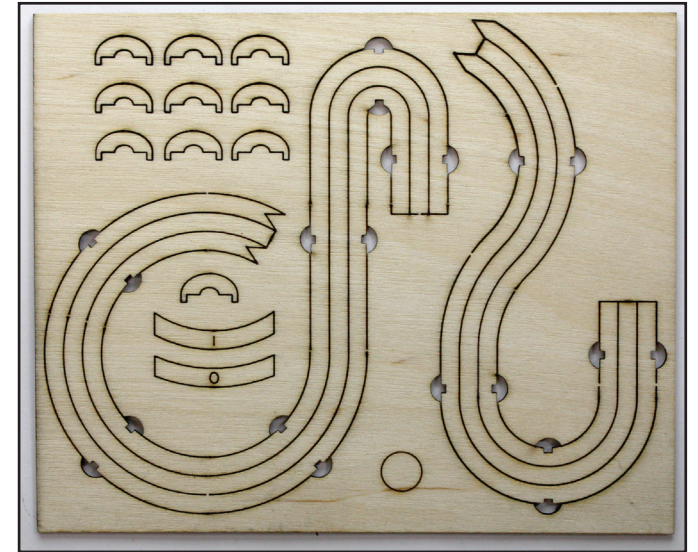
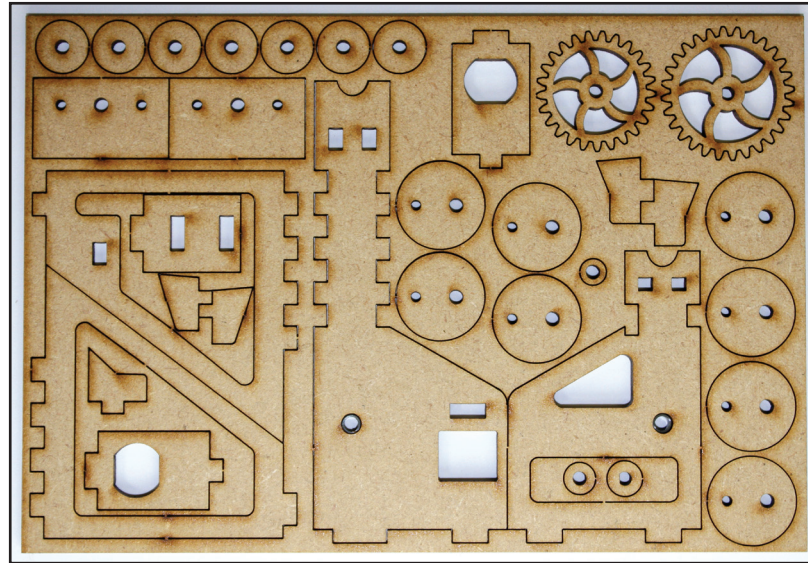
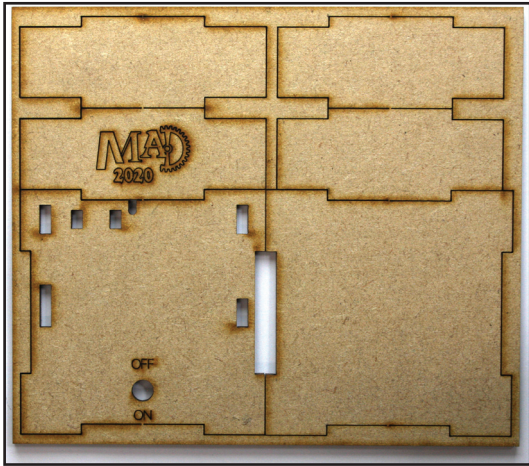
Before you start assembly it is a good idea to study the pictures in these instruction so you know how it goes together. You can dry assemble the frame initially.

This kit contains small parts and is not suitable for small children without supervision.



# Marble Machine No 1 Motorised Assembly Instructions

## Parts

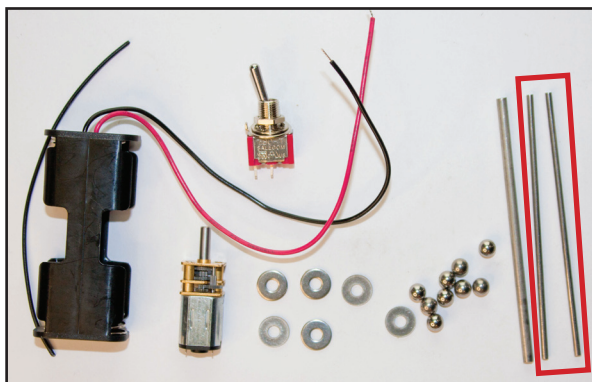
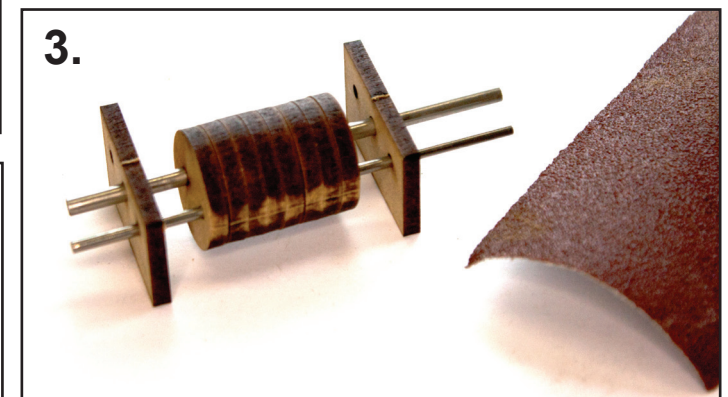
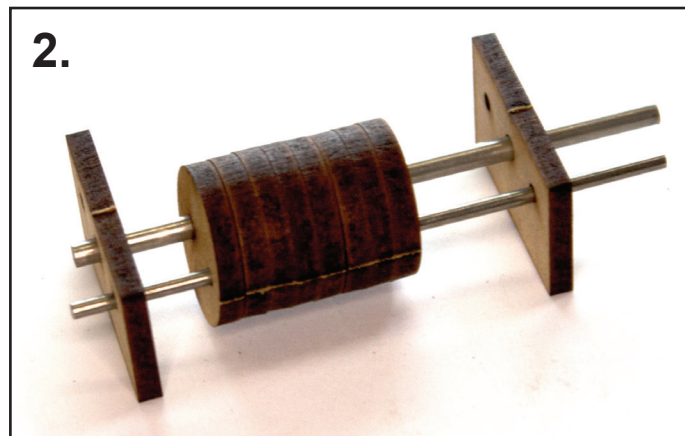
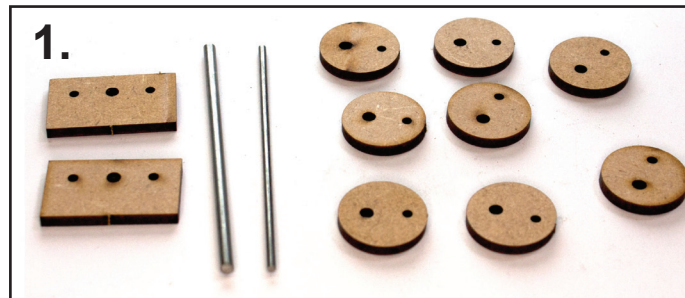
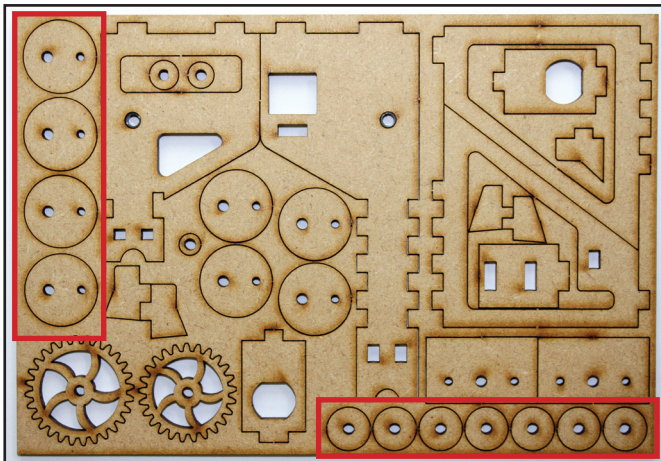




# Marble Machine No 1 Motorised Assembly Instructions

## Camshaft Assembly 1

You will need the pieces highlighted in red in the pictures. First you must sand the pips off the cam wheels. Place them on the 3 mm rods and use one of the 2 mm rod to hold them aligned so you can sand them pips off in one go as pictured.

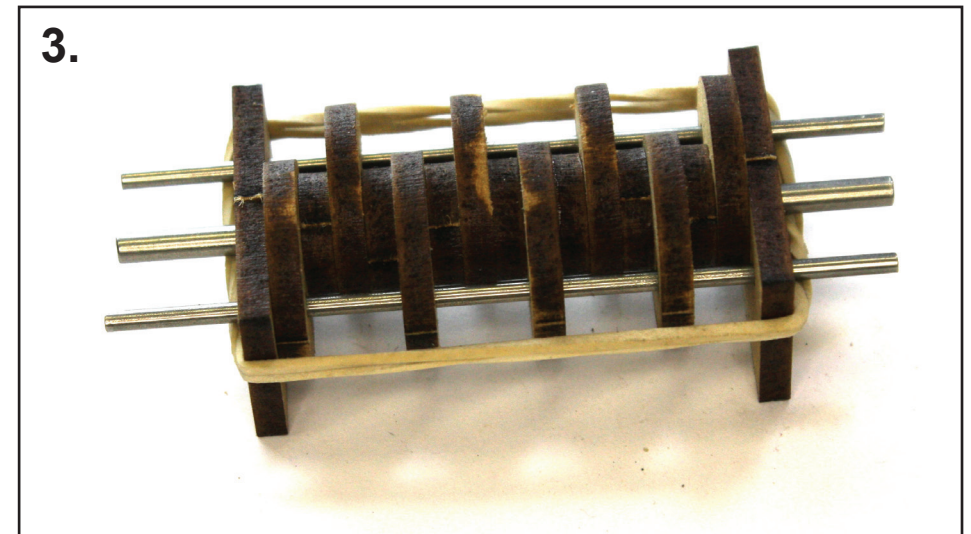
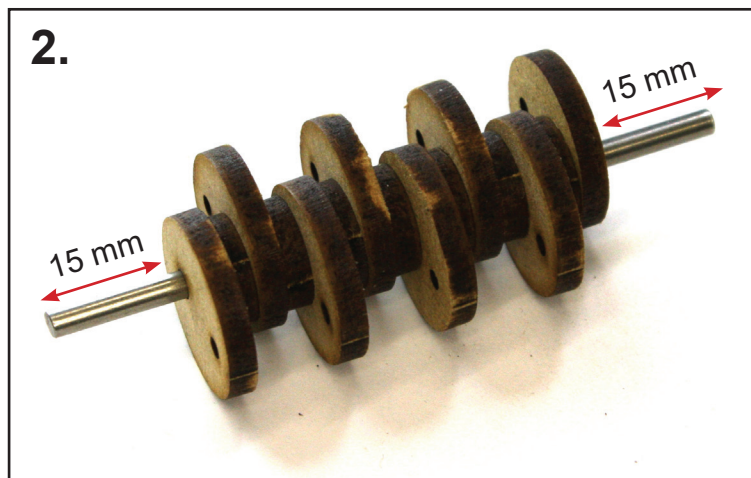
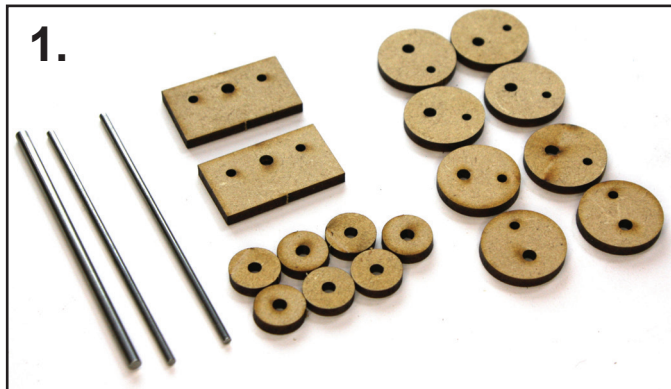




# Marble Machine No 1 Motorised Assembly Instructions

## Camshaft Assembly 2

Layer the cams and spacers with the application of wood glue between each part. The rod should protrude 15 mm from both ends as shown. Use the supplied jigs and 2mm rods to ensure the cams are properly aligned on the 3mm axle. Use rubber bands to hold the assembly together while the glue sets and make sure the jig is on a level surface.



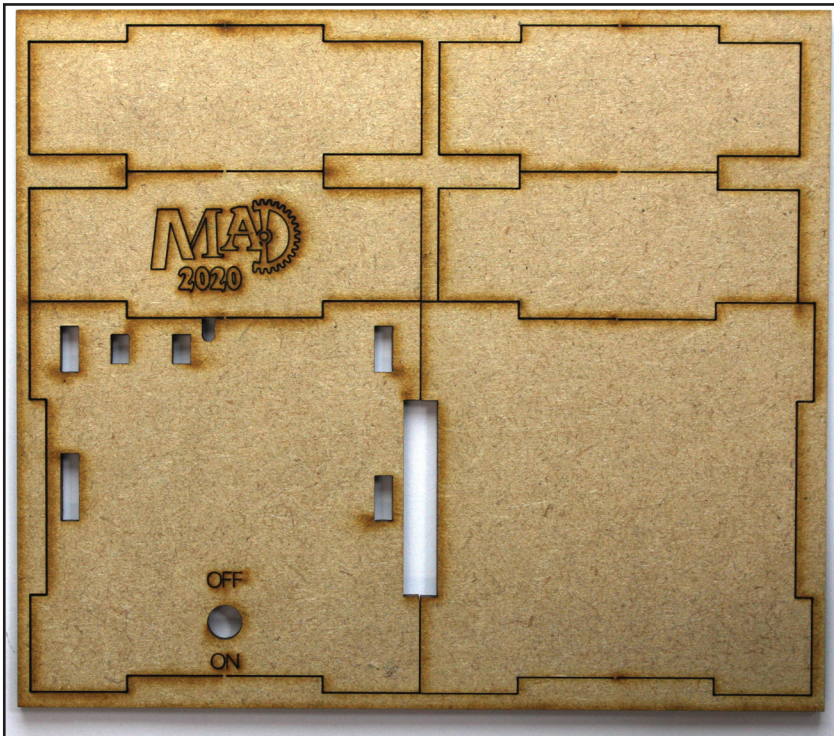
# Marble Machine No 1 Motorised Assembly Instructions

## Base Assembly

The parts can be glued together in one go and the parts held in place with rubber bands. The bottom should not be glued but can be used to hold parts aligned while the glue dries. The bottom is left loose for access to switch and batteries.

If you don't want the text to be visible, simply turn the part so it face inwards. When viewed from the front the holes for the motor mount (circled in red) should face left as shown in the picture below.

1.



2.

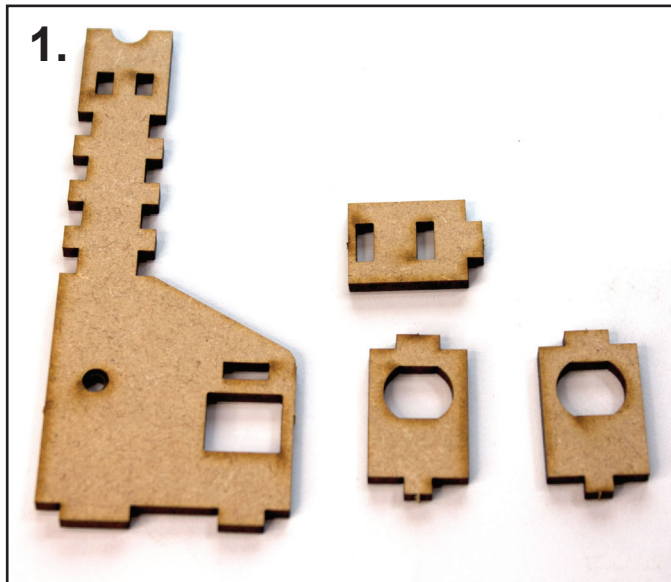




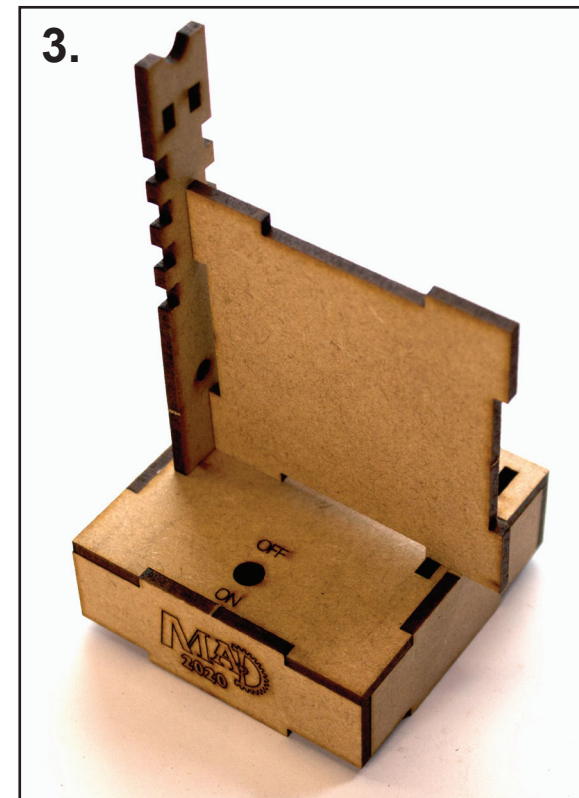
# Marble Machine No 1 Motorised Assembly Instructions

## Frame Assembly 1

Use glue sparingly – you don't want a lot of glue to go inside the frame as this can interfere with the movement of the steps. Any excess glue can be wiped off with a damp rag.



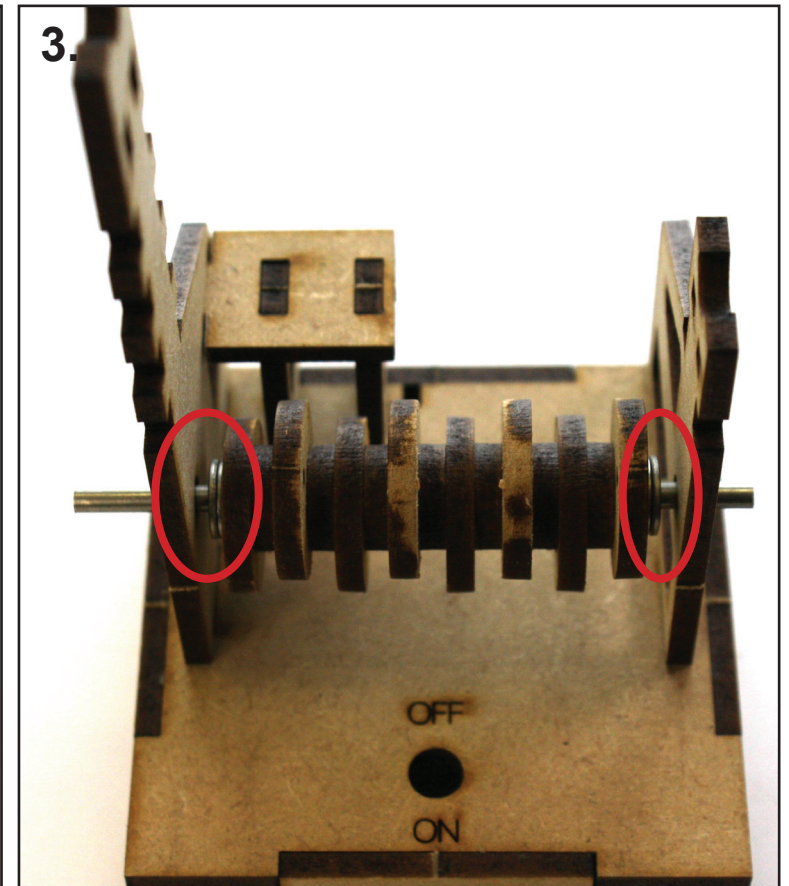
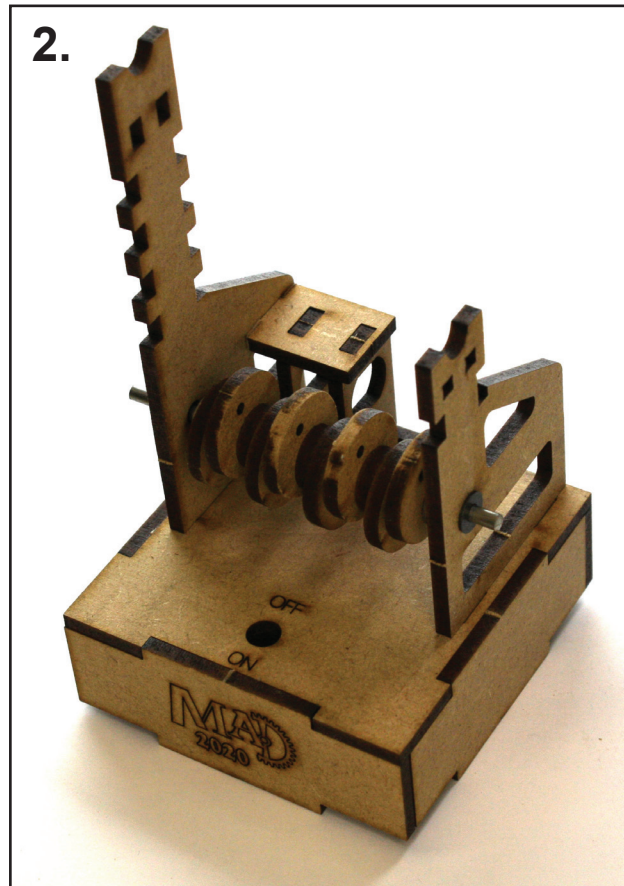
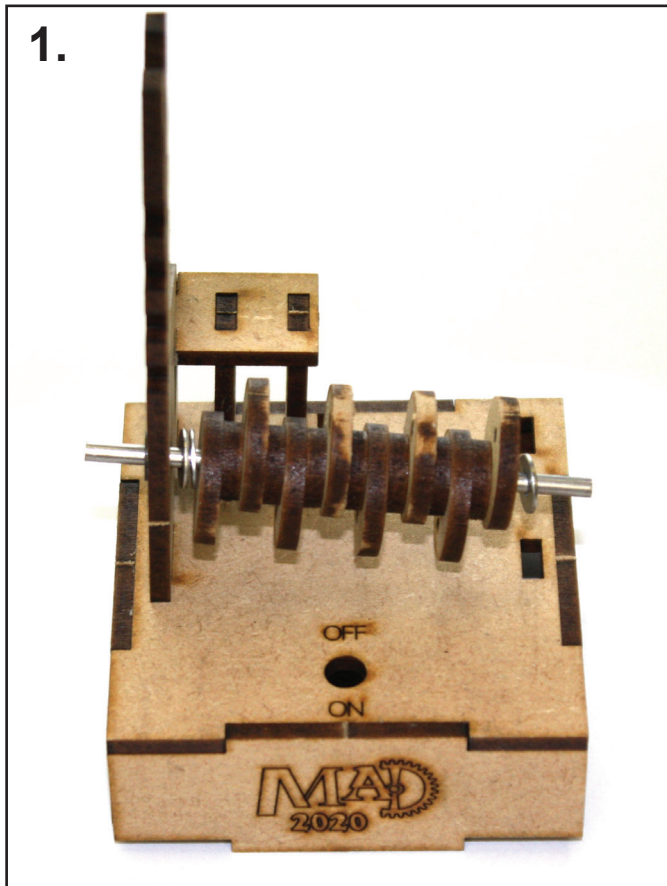
Glue the motor mount parts together and insert them into the tall upright. Insert them into the base to hold them aligned and glue them to the base. Use the bottom of the base to check that the upright is square.



# Marble Machine No 1 Motorised Assembly Instructions

## Frame Assembly 2

Place 2 washers on each end of the camshaft and slide it in place between the frame ends. Before you glue the the right frame upright, fit in place and see if there are any gaps between the washer and the uprights (picture 3). If so go to the next page otherwise move on to 'Track Supports'

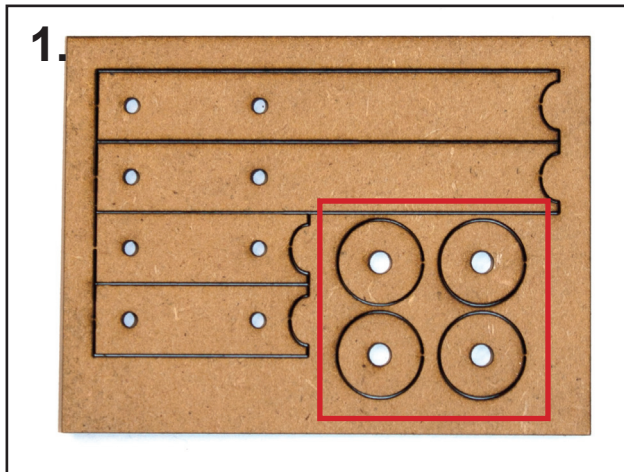




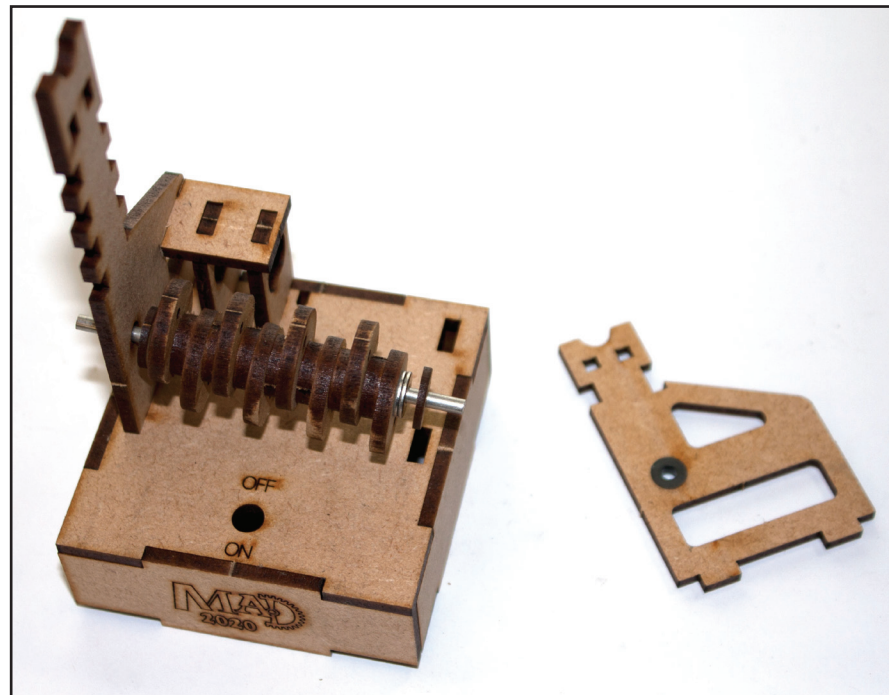
# Marble Machine No 1 Motorised Assembly Instructions

## Frame Assembly 2a 'fixing the gaps'

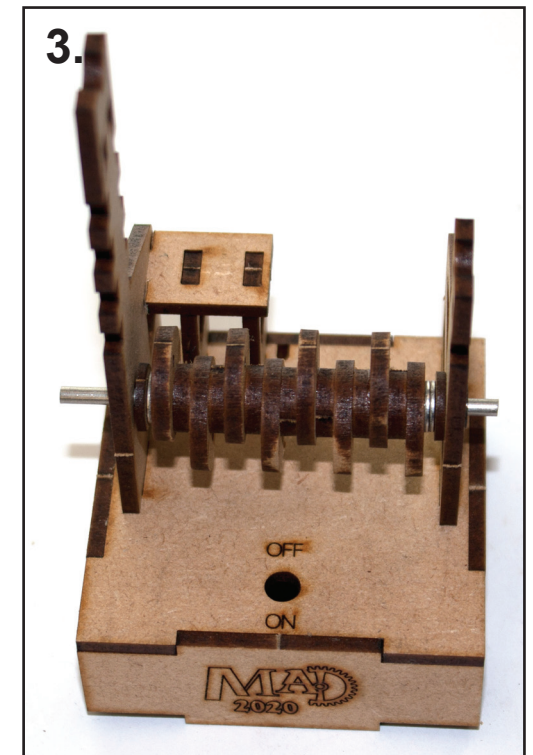
If you have a gap on the camshaft use the spacers highlighted in the picture to close the gap. If they need to be thinner sand as necessary. Place as many of the spacers as you need after the washers to close the gap but make sure the camshaft still turns easily.



2.



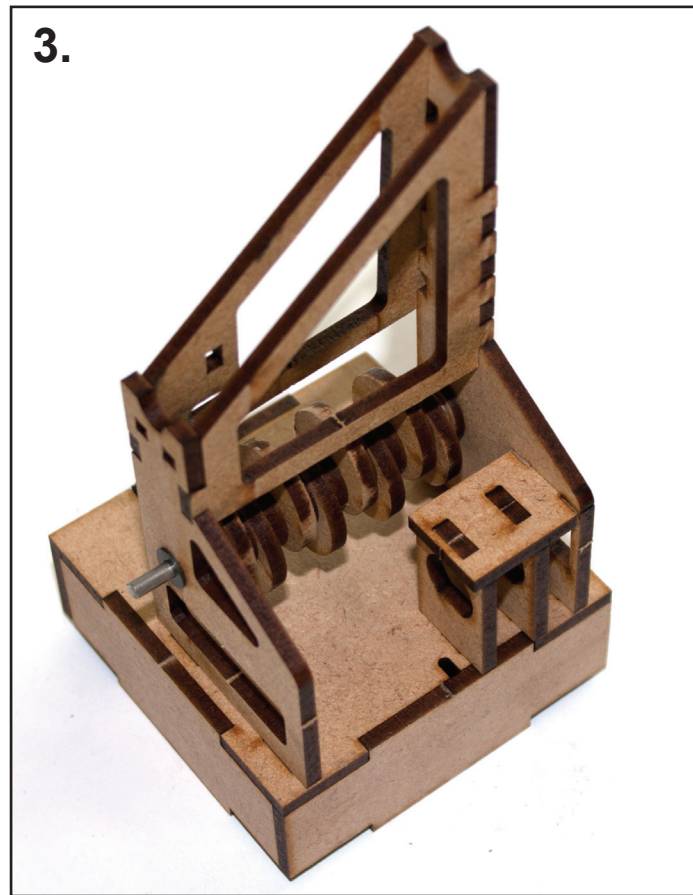
3.



# Marble Machine No 1 Motorised Assembly Instructions

## Frame Assembly 3

Now glue the right, front and rear frame pieces in place. The tabs/slot differ in size on the front and back frame pieces so you cannot attach them the wrong way round. Hold the frame pieces together with rubber bands while the glue sets.





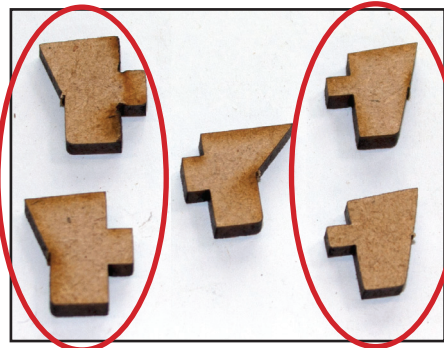
# Marble Machine No 1 Motorised Assembly Instructions

## Track Supports

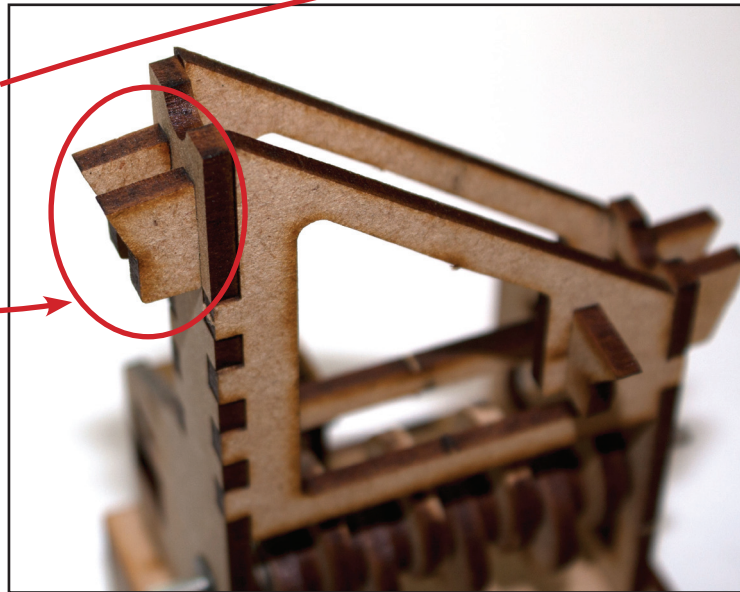
Glue the top, front and bottom track supports to the frame.

1.

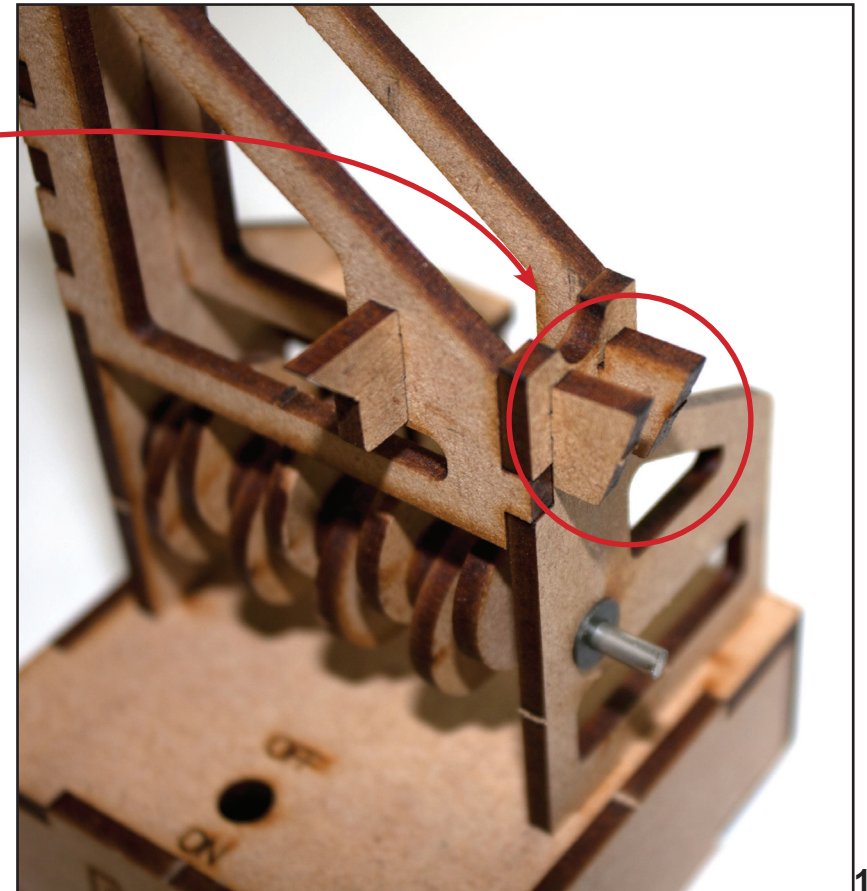
**IMPORTANT** the two supports at the top angle downwards and the two at the bottom angle upwards (see pictures)



2.



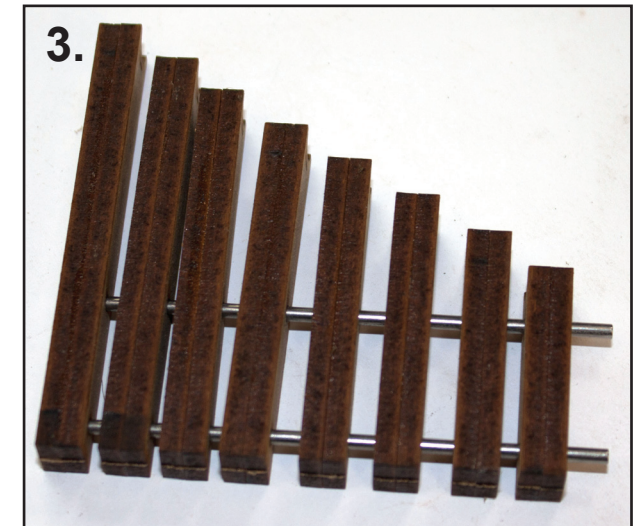
3.



# Marble Machine No 1 Motorised Assembly Instructions

## Steps Assembly 1

Each step consists of two parts. One half of each step has a small line engraved on it. Make sure this line is on the outside as shown in the photo. Apply wood glue sparingly and assemble each step using the 2 mm rods to ensure good alignment. Be careful you don't get glue on the surfaces that shouldn't be joined! you can leave a slight gap between each step to prevent this.

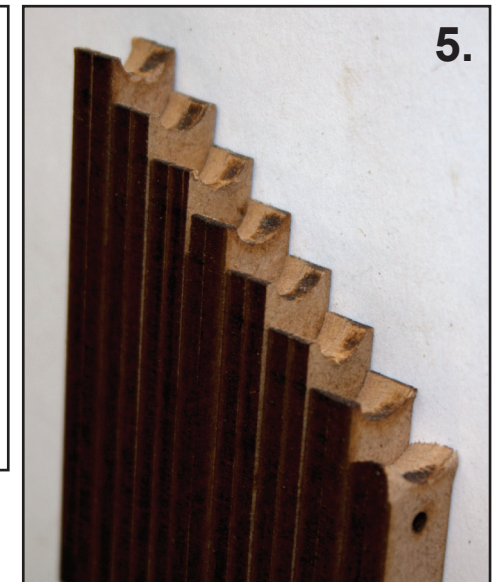
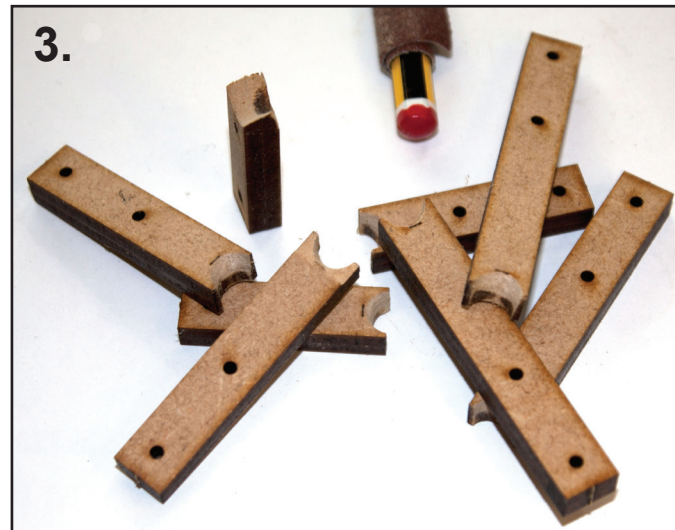




# Marble Machine No 1 Motorised Assembly Instructions

## Steps Assembly 2

If you have a Dremel type tool with a small diameter sanding drum use that but be careful not to remove too much material from a step so it cannot reach above the next step up. Place the steps in the frame from time to time and check that they match up. When a lower step is in its top position it should still be a bit taller than the next step up so the ball will roll from step to step. If you accidentally sand off too much then a piece of scrap plywood can be glued to the bottom of the step and you can then proceed to sand the top until it aligns with the other steps.

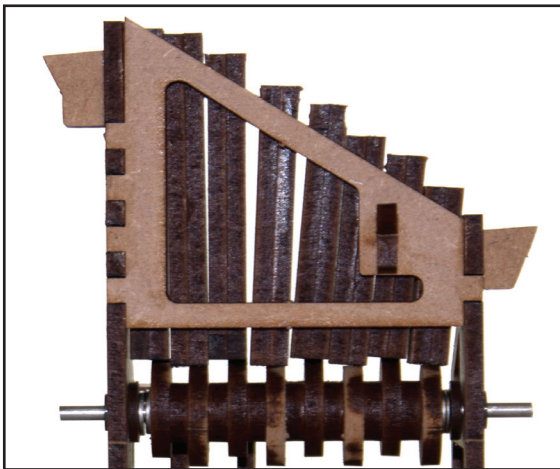


# Marble Machine No 1 Motorised Assembly Instructions

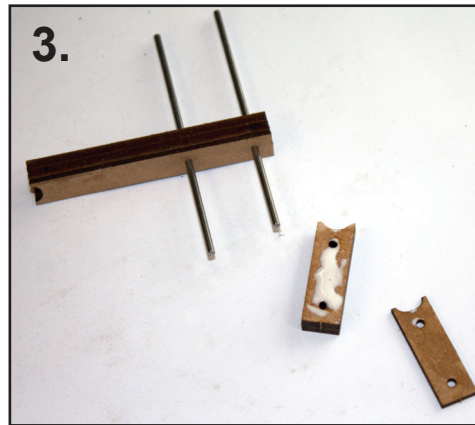
## Steps Assembly 3

Next place the steps into the frame making sure the angle on each step angles down away from the smaller previous step. If the steps are too loose in the frame glue a spacer step to one the steps, repeating as necessary to close the gap in the frame but make sure the steps are loose enough to still move up and down.

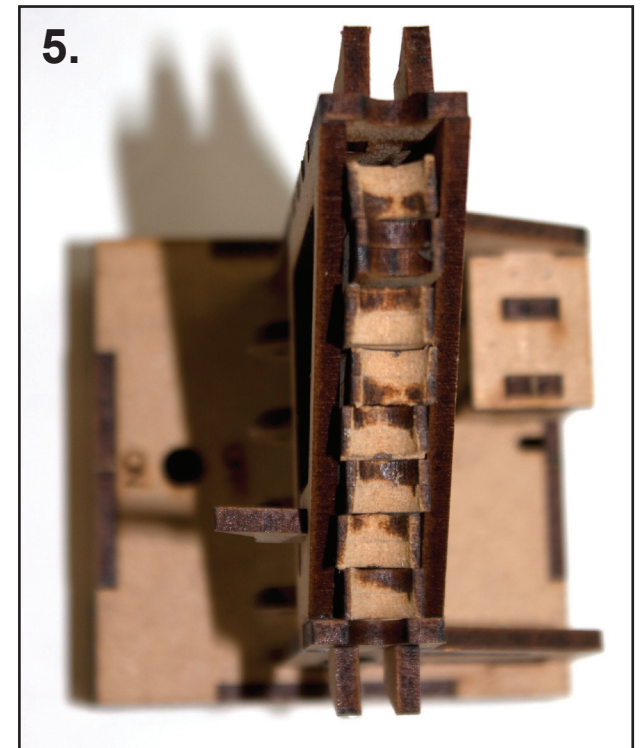
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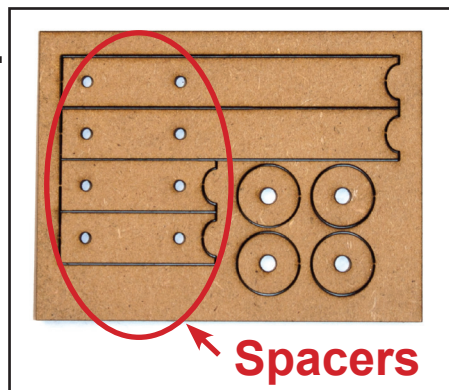
3.



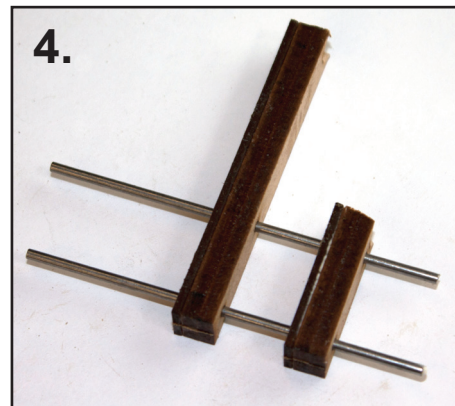
5.



2.



4.





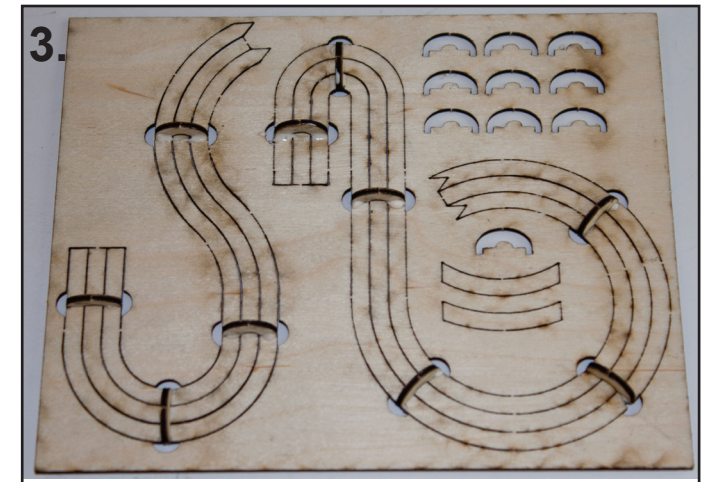
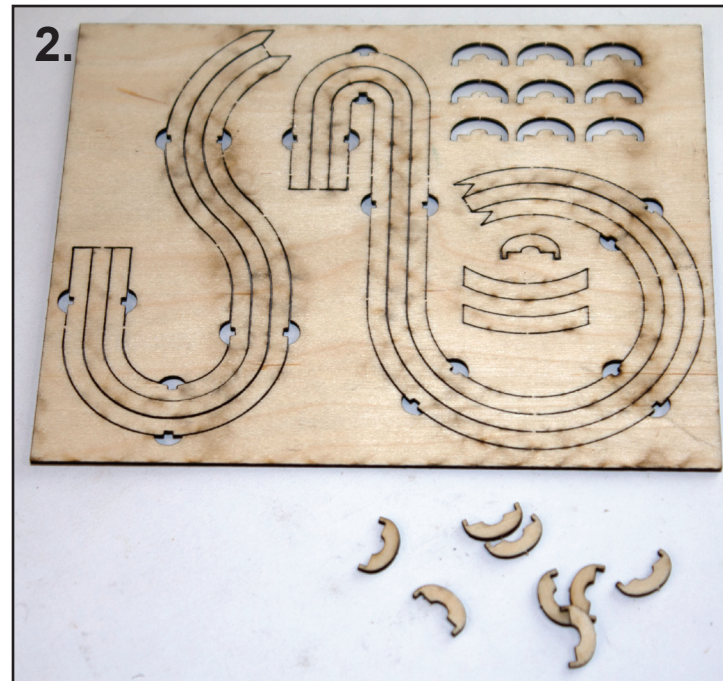
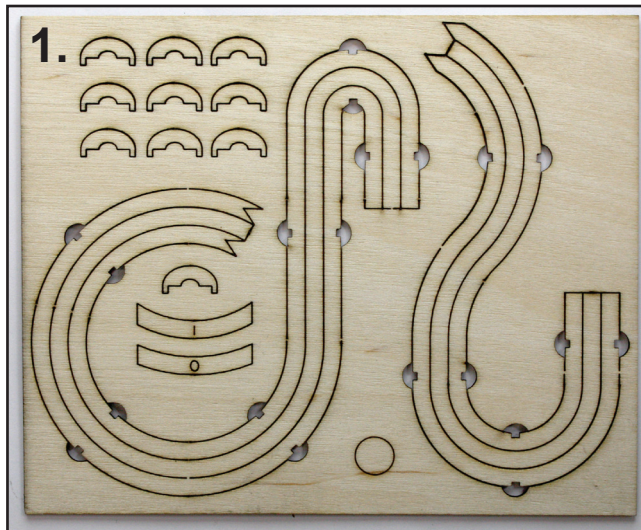
# Marble Machine No 1 Motorised Assembly Instructions

## Track Assembly 1

**DO NOT** remove the tracks from the retaining sheet at this stage. They should be left in place until the track joiners are glued in place.

The track spreaders should be mounted on the opposite side of the side with the “O” engraved so put the “O” face down when you glue the spreaders on. Double check orientation before assembling the track so you don’t end up with a track the won’t fit on the front of the lifter!

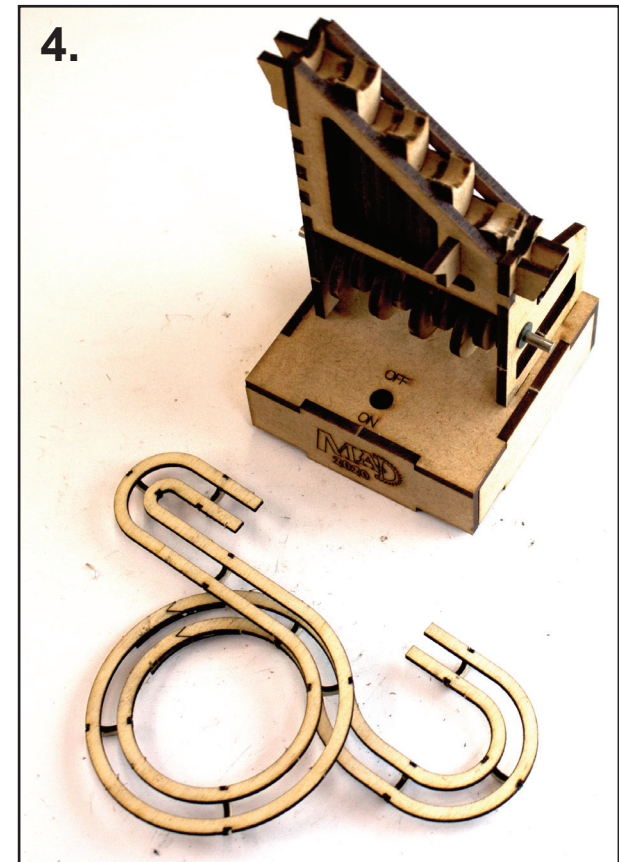
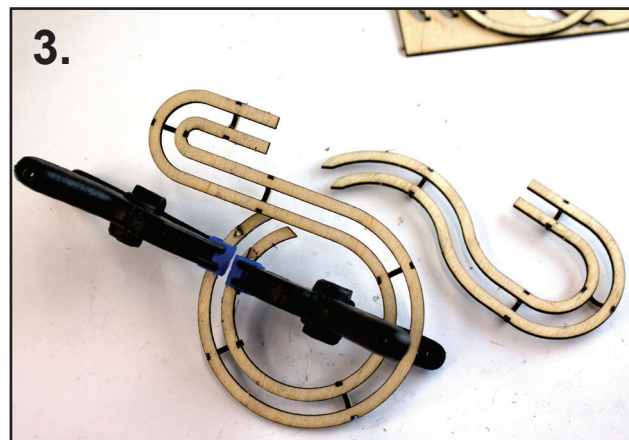
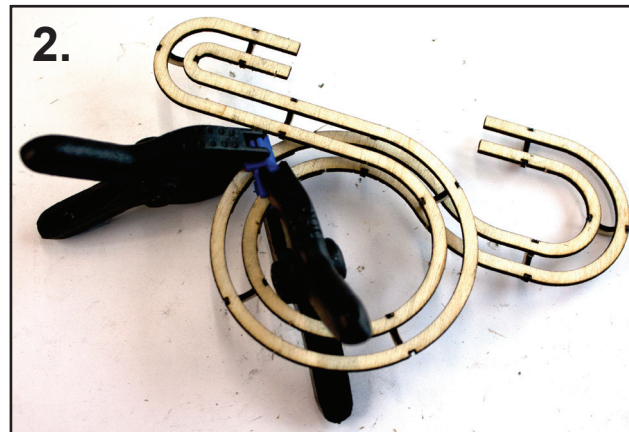
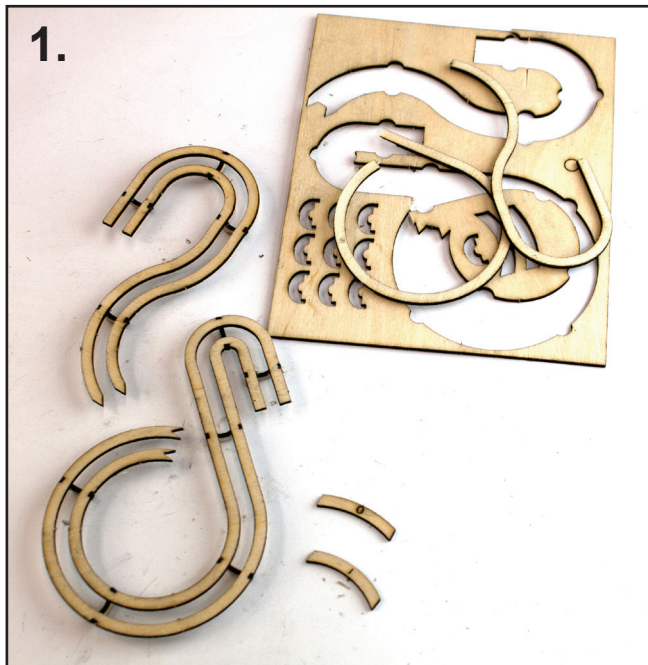
Remove the track spreaders from the sheet, use a sharp knife to cut the retaining tabs. Glue them to the tracks with wood glue. A fast way to do this is to put a good sized blob of glue on a scrap piece of paper and then dip the spreaders in the glue before mounting them in the cut outs in the track.



# Marble Machine No 1 Motorised Assembly Instructions

## Track Assembly 2

The track should be glued to the frame in two stages. If you use CA glue you can simply hold the parts in place while the glue sets. If using wood glue you will need a scrap of MDF and some rubber bands to hold the track in place while the glue dries. Start by glueing the track to the lower track support and the side support. Once dry you can glue the track to the upper track support.

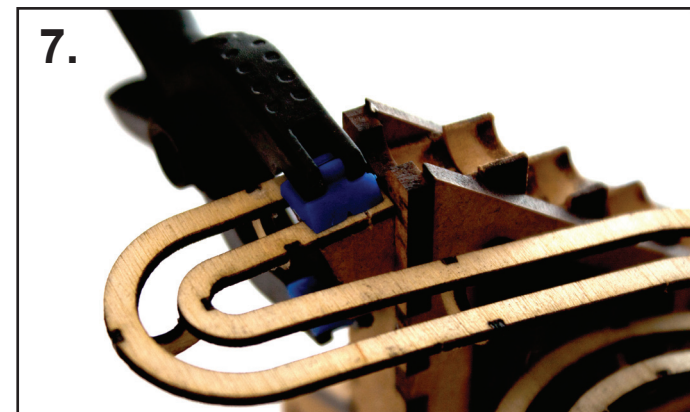
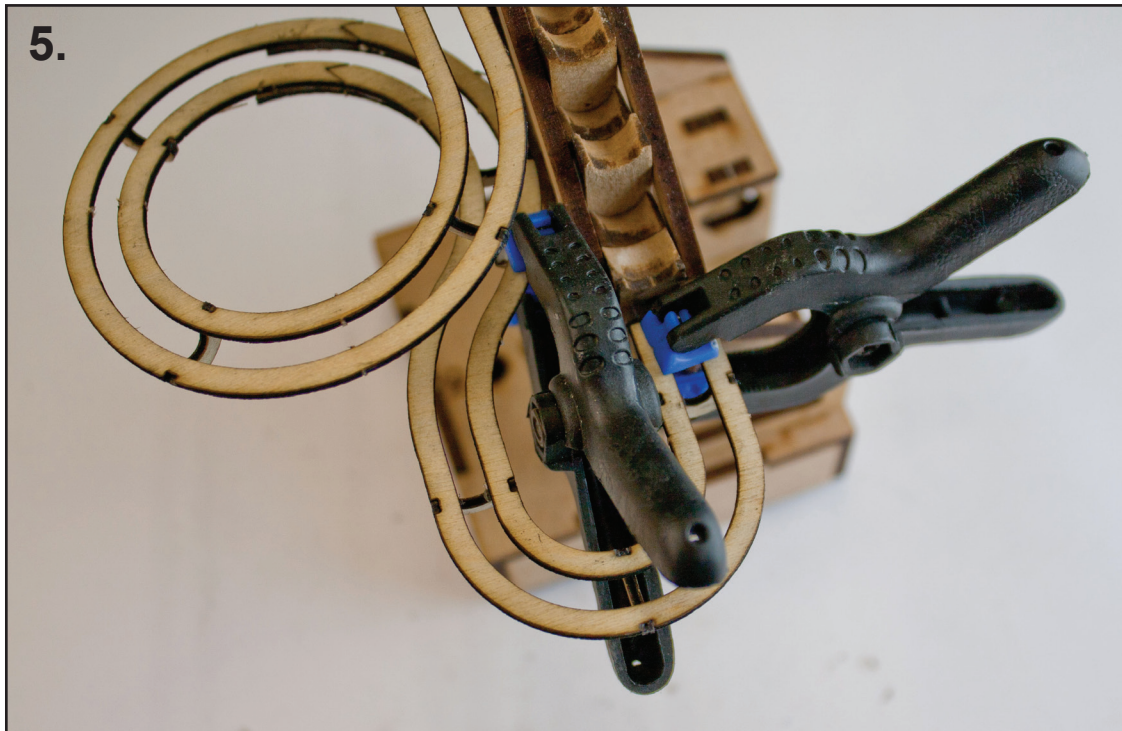




# Marble Machine No 1 Motorised Assembly Instructions

## Track Assembly 2

The track should be glued to the frame in two stages. If you use CA glue you can simply hold the parts in place while the glue sets. If using wood glue you will need to clamp the track in place while the glue dries. Start by glueing the track to the lower track support and the side support. Once dry you can glue the track to the upper track support.

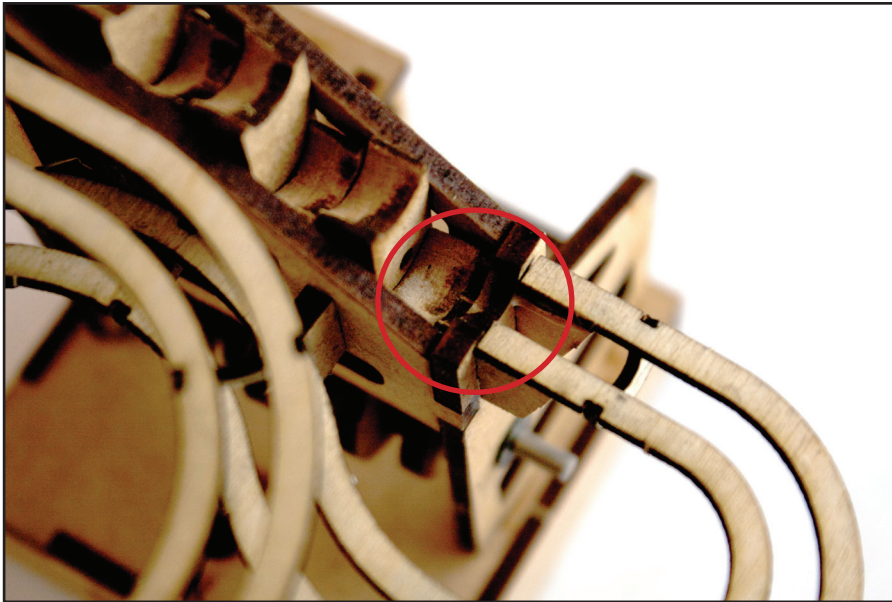


# Marble Machine No 1 Motorised Assembly Instructions

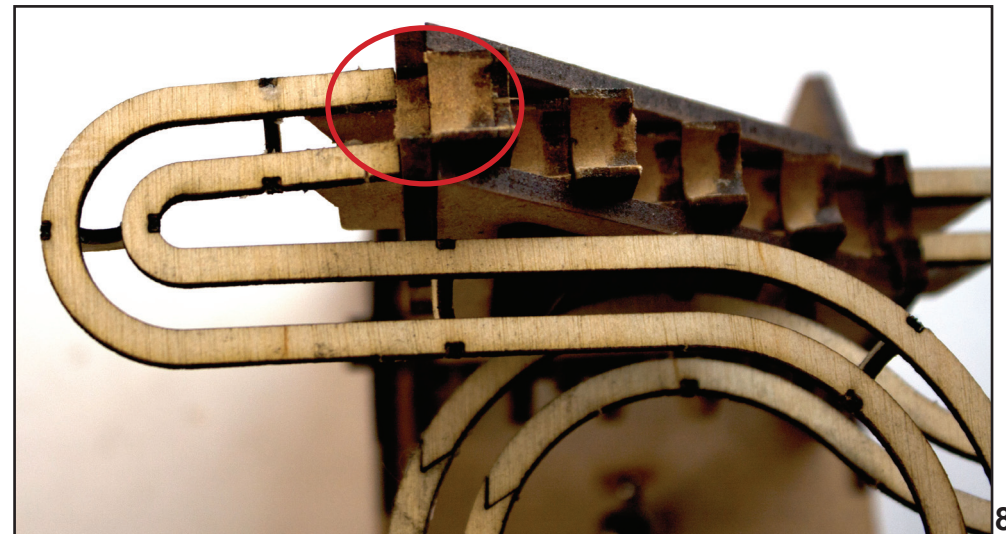
## Track Assembly 3

When the track is glued in place, sand the tops of the uprights at an angle so the balls run smoothly off the steps and onto the steps.

1.



2.



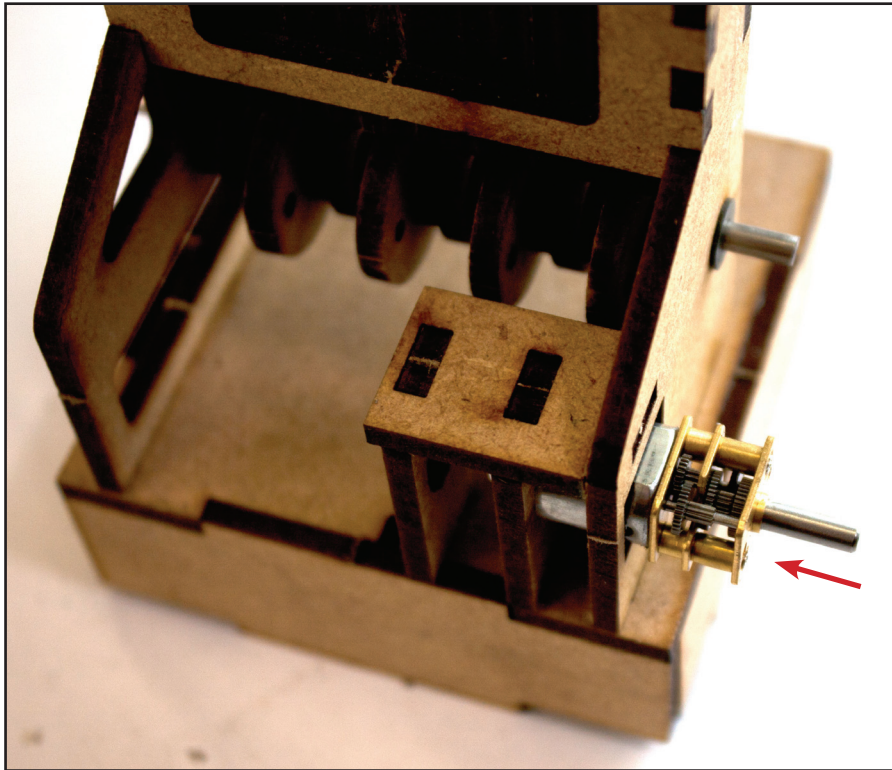


# Marble Machine No 1 Motorised Assembly Instructions

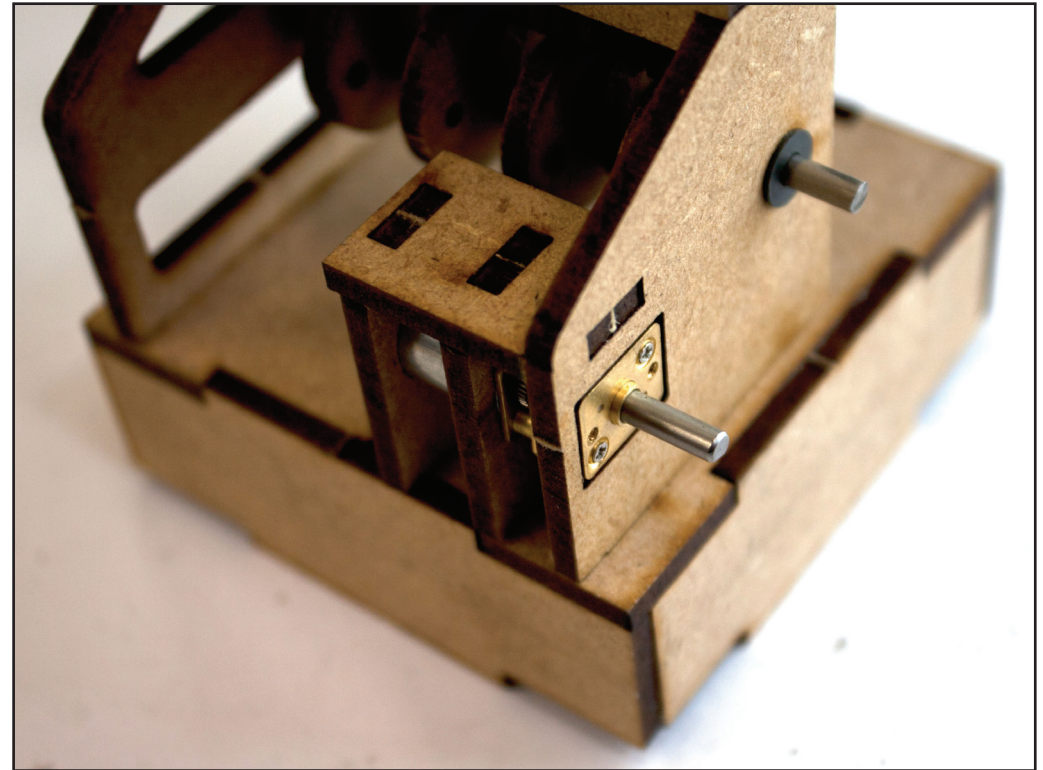
## Attach Gears & Motor 1

Push the gear-motor into the frame so it sits flush with the frame. Glue gear and doubler together and slide onto the motor axle.

1.



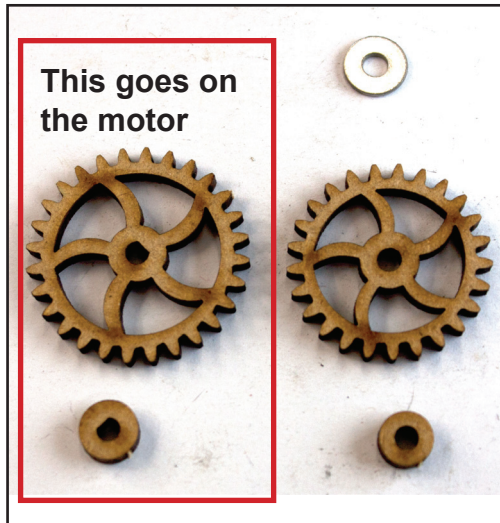
2.



# Marble Machine No 1 Motorised Assembly Instructions

## Attach Gears & Motor 2

1.

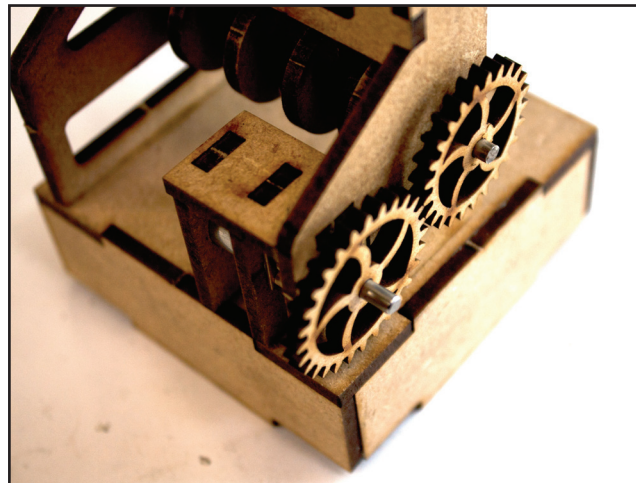


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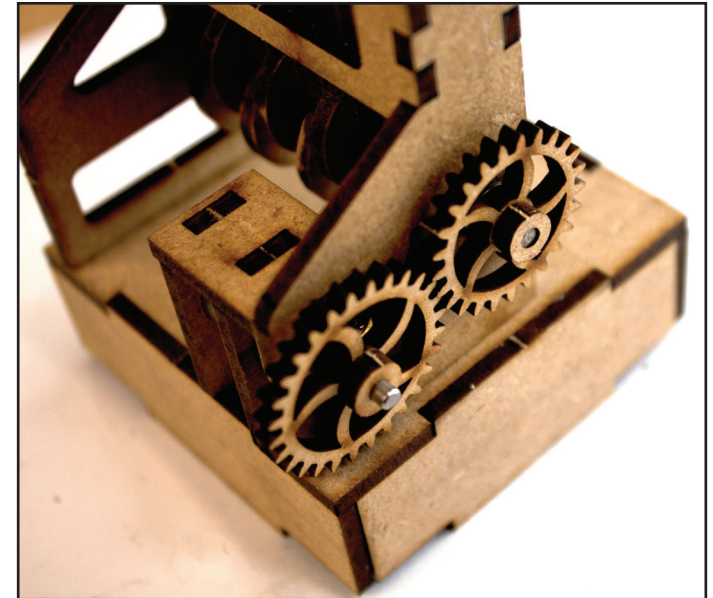


Place a washer on the protruding crankshaft.

3.



4.



Fit the gear and doubler onto the motor shaft and camshaft. A tiny drop of glue between the gear and doubler will suffice to keep the gear in place on the shaft.

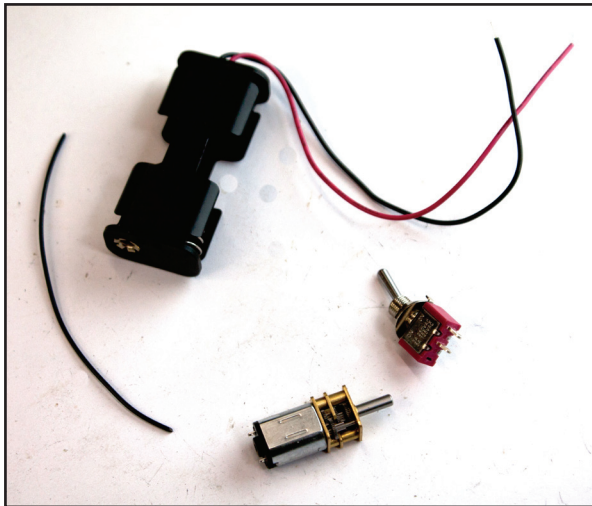
**Take care not to get glue into the bearing hole.**



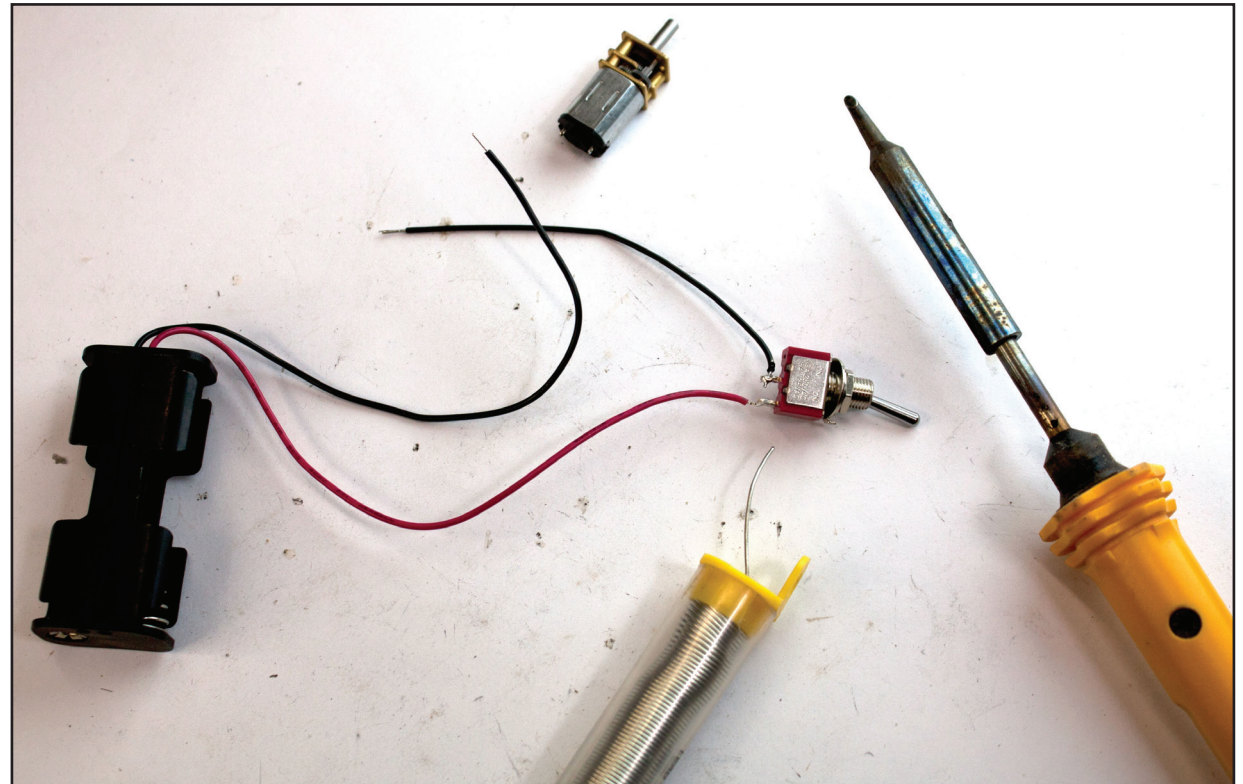
# Marble Machine No 1 Motorised Assembly Instructions

## Wiring 1

1.



2.

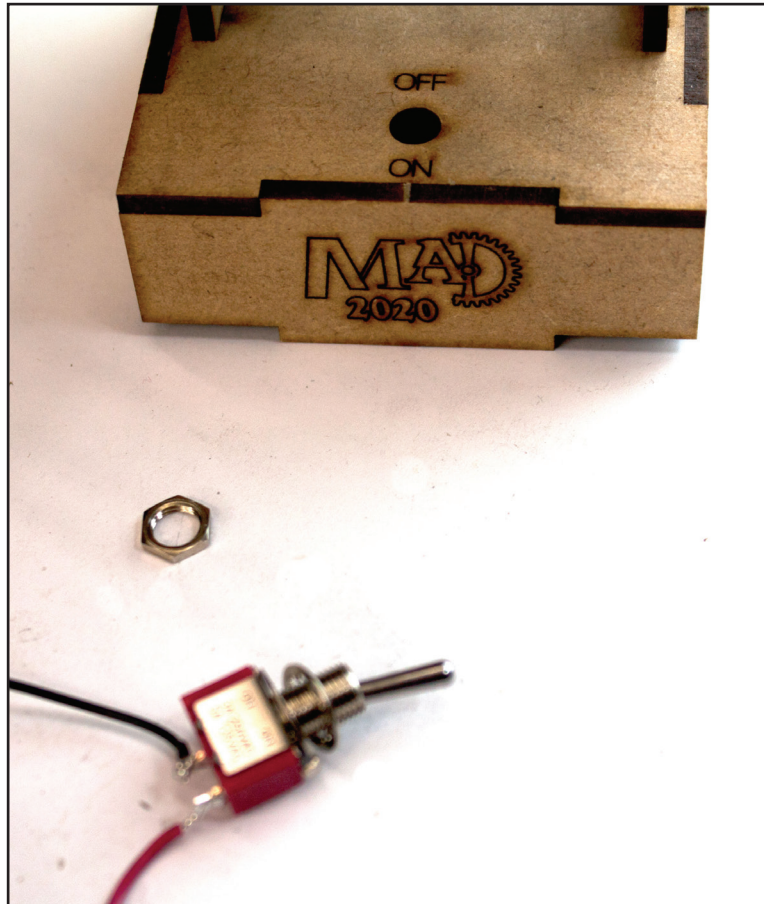


The circuit should be as per the picture below. Solder the leads to the switch but do not solder the leads onto the motor until it is mounted in the frame. Use a 25-40W soldering iron with a small tip and flux cored electronics solder. Keep that big old iron used for plumbing far away from this kit. It will melt the motor backplate and ruin it.

# Marble Machine No 1 Motorised Assembly Instructions

## Wiring 1

3.



4.



Unscrew the nut from the switch and insert the switch through the hole from underneath the base.



# Marble Machine No 1 Motorised Assembly Instructions

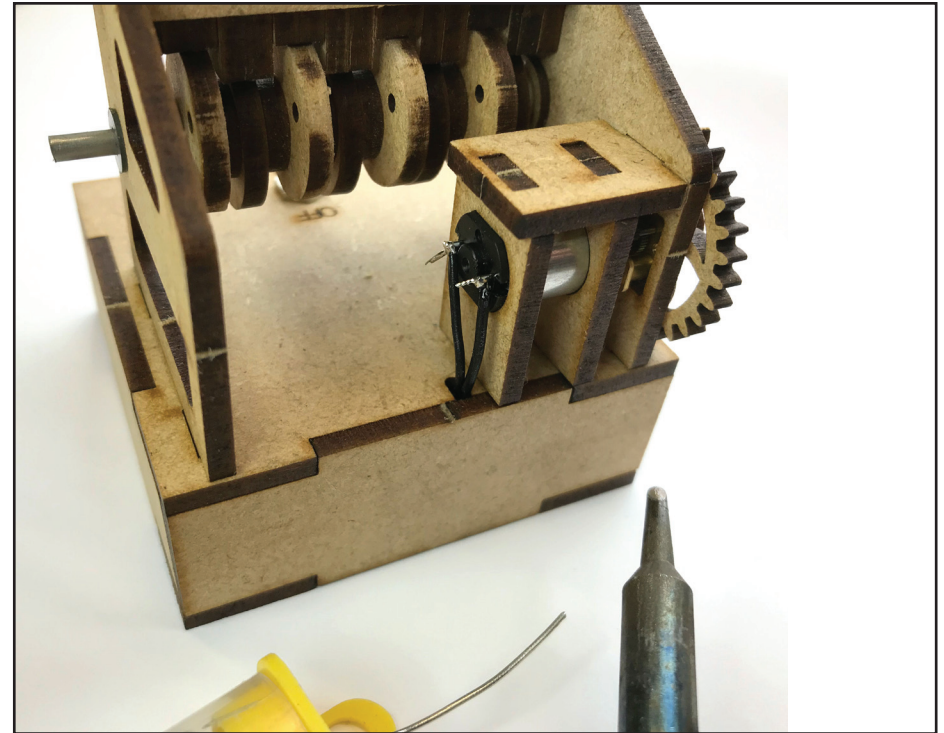
## Wiring 2

5.



Push the two black wires through the small hole behind the motor.

6.

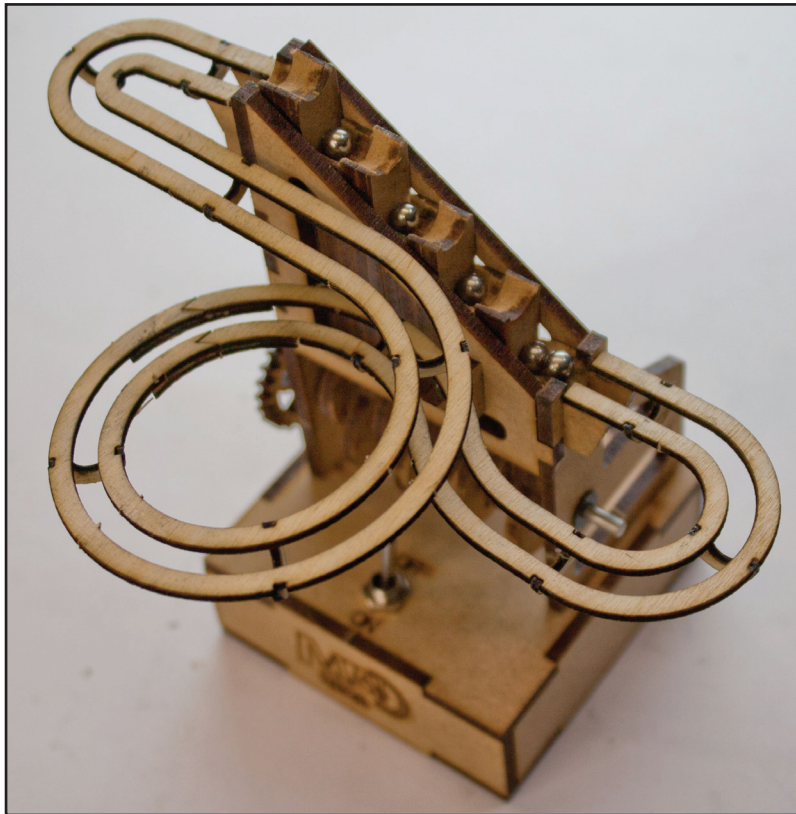


Solder the black wires to the motor it doesn't matter how it is wired.

# Marble Machine No 1 Motorised Assembly Instructions

## Final Assembly

1.



Insert 2 AA batteries in the battery holder and put inside the base. Fit the bottom of the base in place. Place 6-8 balls on the track, hit the switch and set the machine in motion.

2.



You may need to sand the steps and track to ensure the balls go around smoothly.