

# Hero's Steam Turbine

## WARNING – READ FIRST:

When in operation Hero's steam turbine will get very hot. Do not attempt to move the turbine while in use and leave to cool before touching. Do not try to refill with water immediately after use. Do not get too close to turbine while in use. Keep young children away. Never run the turbine without water. If the turbine starts to slow, blow out the burner as it has run out of water. Keep the area around the turbine clear and be aware it may get slightly wet.

## This kit includes:

Hero's steam turbine  
Steam safety valve  
Methylated Spirit (denatured alcohol) Burner  
Cotton Wick  
20ml Syringe  
This manual

## You will need:

Methylated Spirit (denatured alcohol)  
Water  
Matches or a lighter



## History

It is commonly believed Hero of Alexandria (c. 10 - 70 AD) invented the first steam turbine (see illustration on left). It was known as an aeolipile, or sometimes an aeolipyle or eolipile. Vitruvius (c. 80 BC – c. 15AD) mentioned the aeolipile by name, hence many historians believe its origins are a little older predating Hero. The name aeolipile comes from the Greek words "aeolos" (Greek god of wind) and "pila" (ball). It uses rocket-like propulsion to turn, forcing high pressure steam from small nozzles at its side.

## **Fitting the wicks into the burner**

Before running the turbine for the first time you will need to insert the five wicks into the burner. This can be tricky because the wick is a tight fit. First cut the wick with sharp scissors into five strips about 4cm long - there may be some spare wick left over. It is important that the wick is not frayed at the end. One solution to this is to burn the end briefly (without any Methylated Spirit / denatured alcohol) as this creates a cone shaped end. Alternatively, wrap some thin tape tightly around the end. Wrap it round once leaving some tape connected. You can then push the tape through the hole and pull the wick through.

## **Using the Hero steam turbine**

- 1) Fill a small cup or bowl with water. Ensure there is no debris in the water as this may clog the nozzles in the turbine. Take the supplied syringe and place the end just under the surface of the water and draw the plunger up until you have about 12ml of water in the syringe.
- 2) Unscrew the steam safety valve from the top of the turbine. Don't hold the ball/boiler while doing this – instead use the provided finger grips at the top.
- 3) Once the safety valve has been removed place the end of the syringe into the hole at the top. Syringe in all the water. The water should go straight in.
- 4) Screw the steam safety valve back into the top and tighten to be finger-tight (?).
- 5) Remove the burner from the plinth and take the top off. Fill the burner with Methylated Spirit (denatured alcohol) up to the marker in the inside burner and place the top back on.
- 6) Place the burner carefully back on the plinth directly under the ball/boiler.
- 7) Make sure the 5 wicks are protruding out of the top, then light with a match or lighter. Keep back when lighting and be aware that the flame can almost be invisible when lit.
- 8) Once the flame begins to die, blow out the burner. Use dampened fingers to stop wick from smouldering as this stops the wick burning and reduces the chance of having to replace it. If the turbine begins to slow it has probably run out of water so blow the burner out.

## **Troubleshooting**

### **Water does not want to flow into boiler/ball**

If you find that most of the water flows back out when syringing water into the turbine, then you have an air bubble. With the safety valve off, blow air into the top. You may find that some water will squirt out of the nozzles. After you have done this try refilling again. This usually only happens if the turbine has already been used once recently.

### **The turbine spits water as it is warming up**

Do not worry if this happens - it is quite normal. It should only be warm water and it will only do this for a few seconds.