

SSERC Make a Hero's Engine

"I'm looking for a simple experiment to show motion from steam production." On receiving this query, vague memories of coming across an on-line guide to making a Hero's Engine made from a soft drinks can were stirred (not shaken). We set about checking to see if it actually worked. Having determined that it did, we then assessed whether or not it was safe.

You need: A full soft drinks can (unopened), Bunsen burner, clamp stand, sharp, pointed object (e.g. drawing compass), strong thread, safety screen, CD player playing Bonnie Tyler's Greatest Hits (optional).

Lie the can on its side, preferably in a sink. Poke a hole in the side, about a third of the way from the bottom of the can (Figure 1).

The drink will probably come squirting out. Make a hole at the same distance from the end, at the opposite side of the can.

Let all the drink drain out of the can. This can take a while. Put your sharp object into each hole. Lever the pointer back (Figure 2).

Do the same at the other side. You are trying to make the holes face in the direction shown Figure 3.



Figure 1 - Making a hole in the can.



Figure 2 - Going off at a tangent.

Carefully bend the ring pull as shown. Avoid breaking it off and avoid breaking the seal on the can (Figure 4).

Turn on a cold tap. Place one of the holes under the stream of water so that the can begins to fill with water. Try to judge the point where the space between the bottom of the can and the holes is about half full.

Now suspend the can above a Bunsen burner using a clamp stand (Figure 5). Check that it is stable. You might make it more stable by placing weights on the clamp stand base. Place a safety screen between all observers and the can.

Light the Bunsen burner. Put it on a blue flame and allow the water to boil.

When the water boils, steam is pushed out of the holes. This causes an equal and opposite force on the can. If the steam comes out at the correct angle (at a tangent), the can should rotate.

The can might wind the string up and come to a stop. If this happens, turn the gas low. The can should spin in the other direction as the string unwinds. Turn the gas back up and it should spin in the desired direction again.

Safety:

- Be careful when making the hole. Grip the can with one hand.
- Be careful when using the pointed object.
- Beware of sharp metal around the hole.
- A safety screen must be used.
- Beware of steam and hot water if adjusting the Bunsen burner.
- Do not let the can boil dry.
- The can will be hot after this activity. Allow it to cool before handling.

Make sure you can reach the gas tap without putting your hands or face anywhere where they could be splashed by hot water or scalded by steam.

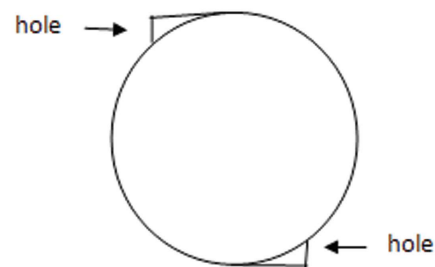


Figure 3 - Hole positions.

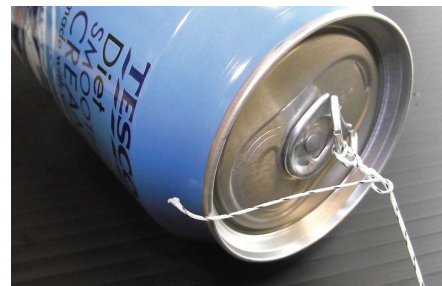


Figure 4 - Bending the ring pull.



Figure 5 - Set up and ready to go.