

Paint Can Gasifier Wood Stove

By: Jim Hensel
Portland, Oregon USA
jameshensel[at]comcast.net
May 2007

These stoves were inspired by Tom Reed's Woodgas Stove:



One Gallon (~4 l) Outer Can
One quart (~1 l) combustion
Chamber



Five Gallon (~20 l) Outer Can
1 ½ Gallon (~6 l) combustion Chamber

The steps for each of the stoves are very similar. Included here are the steps for the larger stove. Please contact the author for more pictures or instructions on construction of the smaller stove.

Steps:

1. Parts list:

- One clean five gallon paint bucket with tight lid
- Two clean one gallon paint cans with at least one lid.
- Computer muffin fan. The one I used was 12vdc (~1.2 watts)
- 4" elbow or some manner to attach the fan to the bucket in a slightly indirect way. [The one gallon stove has the fan attached directly to the bottom of the can so it is possible to attach the fan to the side of the bucket. I was just worried about getting the fan too hot.]
- Sheet metal flashing to make a heat shield.
- Sheet metal screws including at least 6 1" (6cm) screws.

2. Tools:

- a. Tin snips. Note, many snips are “handed” – that is, they are built for straight, left or right cuts. The ones used here are left handed – that is, they cut straight or toward the left (counterclockwise). I find these easier to use than trying to make straight snips cut in a direction.
- b. Power screwdriver
- c. Drills bits
- d. Gloves (mandatory)
- e. Marker
- f. Three C-Clamps (optional)



Flashing

3. Center the small lid on the big lid with both lids facing as if they were being put on the same can. Mark around the smaller lid so you end up with a circle on the big lid. The goal is to cut a hole in the big lid so that the small lid will fit snugly into the hole. Set the large lid on the bucket and use the point of the tin snips to push a hole into the big lid somewhere near the center (inside the circle you have marked). Slowly work the tin snips in a spiral until you can cut out the circle you have marked.



Below is the finished cut hole with the small lid pushed through the big lid (as seen from the underside). The lip on the small lid will keep it from coming all the way through the big lid.



4. Cut the flat material out from the inside of the small lid to make a ring. Again punch the snips through the lid in the center (after laying the lid on the small can to keep from distorting it). Cut it upside down so you can get closer to the outside ring.



You will end up with a very jagged edge. Not to worry. You can use a hammer to carefully collapse this edge against the ring. When it is later hammered into the can, it will be inside the can groove.



Here it is turned the other way and hammered against the ring.



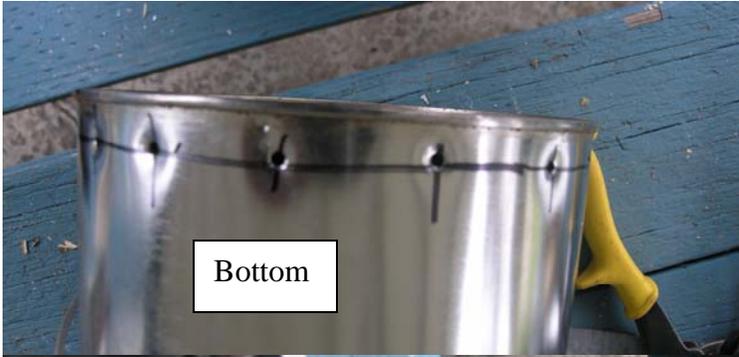
5. Cut the bottom off of one gallon can and the top off the other.



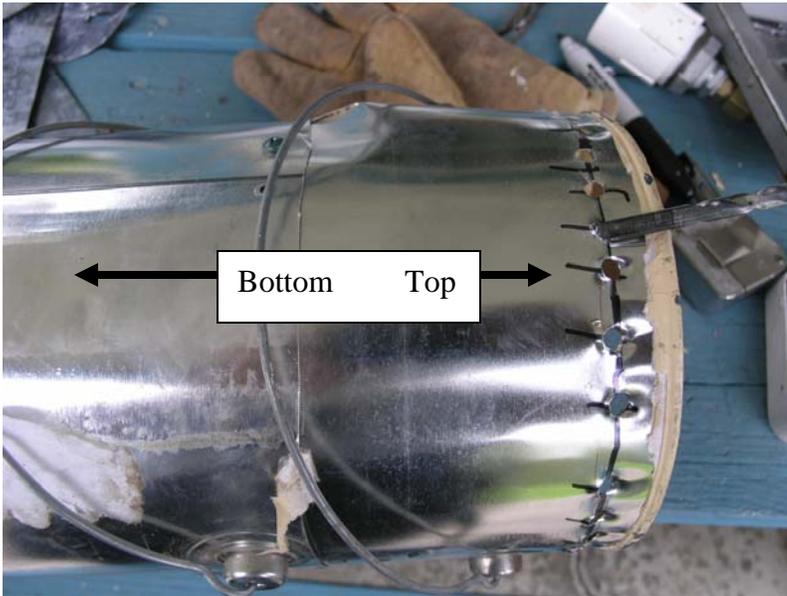
6. Join them together to make the combustion chamber so that it is the correct height to fit into the bucket with about 2" (5cm) clearance above the bottom of the big bucket. I used self tapping sheet metal screws. They include a "drill bit end" so you do not even have to drill a pilot hole.



7. Drill 12 1/8 inch (~3mm) holes one cm up from the bottom of the combustion chamber on the sides to create the primary combustion air inlets. Drill 32 7/32 (~5mm) holes one cm from the top of the combustion chamber on the sides to create the secondary combustion air inlets. Space all the holes evenly around the outside although I eyeballed it by roughly dividing the cans into quarters, etc.



I used the drill bit to bend the upper holes so they would “shot air” a little bit downward into the combustion chamber. Below you can see I only have two holes left to bend.



8. Attach the combustion chamber to the big lid using the ring you cut previously and some sheetmetal screws. First try to attach the ring as if it is a paint lid. It should “stick” a bit. C-clamps help as well but are not necessary. Then use longer sheetmetal screws to attach the ring to the combustion chamber. The big lid is kind of free floating but the flange of the ring keeps it from coming apart. I used six screws in the end to stabilize the combustion chamber.



9. Make and attach a heat shield to the big Lid. The sheet metal flashing I used was not quite wide enough so I had to use two pieces. You could use more cans for this material if they are available. The purpose of this shield is to disrupt the flow of heat from the combustion chamber to the outside of the bucket. Also, the shield directs the air up to the upper holes and is preheated along the way. You can either cut tabs and attached them both to the underside of the lid and the shield with screws or, as I have done here, cut out the material between the tabs and bent them over to attach the shield to the lid. Try to make the gap between the shield and the lid as small as possible so the air has to go between the shield and the combustion chamber for preheating.



10. I also cut a piece of sheet metal and bent the corners down to create $\frac{3}{4}$ " (2cm) legs to the resulting "table" which I fit into the bottom of the bucket to make a heat shield for the bottom of the combustion chamber. But remember, the airflow needs to get inside the heat shield to the primary and secondary air holes so don't make the gap between the bottom heat shield and the side heat shield too tight.

11. Attach the fan. I found all of the metal parts used here at the recycling center, including a broken 4" elbow and the canned chicken can used to attach the fan. I just cut the hole in the side of the bucket, pushed the elbow through, marked how far it went through then took it out and cut slits so I could reinsert it and bend the slit pieces over to hold it in place.



Here is the fan attached to the one gallon stove.



12. Fill with wood and light. Then plug in the fan. This stove still needs a pot holder (likely about ½" (1 ½ cm) clearance above the fire) and a pot skirt, neither of which were fitted as I did not have the right pot.



My next adventure is to use this as a platform for testing whether I can make the fan run on steam generated by the stove.