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Making

Your own pulsed air wood stove.

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- Skills and guides - DYI, Making things. -

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Description :

An example of what DIY can lead you to do! A Sierra like titanium wood stove!

I have had a sierra standard wood stove, these stoves are excellent, they allow people to use all wooden organic parts you may encounter when you hike, therefore leaving you with an indefinite amount of fuel to use. Only restriction, they use AA batteries, but they can run some 10 to 20 hours on one.

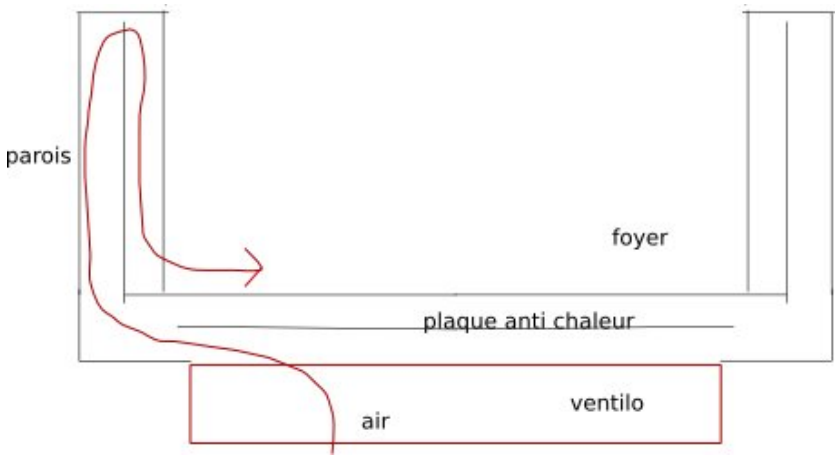
The sierra model http://www.zzstove.com/sierra.html is an excellent conception, it allows to burn wet wood without problems, and generate an amount of heat that is equivalent (if not better) to the best modern gas or multi fuel stoves.

The trouble with the sierra model is that it weight 700 grammes. They make a titanium version quite cheap, but I decided to make my own titanium versions, 4 models, 2 for me , two for friends, in order to be able to buy the plate of 0.5mm titanium (at 250 euro the square metre!) 2.5 mm pop rivets are used for assembly and you will need some aluminium and some stainless steel ones.

The material needed is titanium sheet, 0.5 thickness. Aluminium in 0.5 and 0.8, as well as aluminium perforated grill. The titanium can be replaced by steel, making construction heavier, but cheaper and easier.

Principle

The principle is that a fan pulses air towards the bottom of the combustion chamber. the air goes up on the sides to almost the top, then down toward the holes on the sides at the bottom of the stove. It thus arrives extremely hot, and helps maintaining the combustion, even with wet woods. A part of this air escapes at the top, and helps the flames combustion to complete by injecting air directely, and centres the flame in the middle of the stove, avoiding licking flames and abnormal heating of the aluminium top.



diagram

Here is the diagram (in French, sorry)

parois=sides plaque-anti-chaleur=heat blocking plate ventilo=ventilateur=fan air=air (ah ah) foyer=furnace

Missing here is the top flux, which escapes at the top of the furnace, and helps centering the flame and burning combustion gases.

It would actually be interesting to adapt this stove to the principle Woodgas wood gasifier stove. Woodgaz stoves are

a bit more sensitive to what they burn, but they darken the bottom of the pan much less.

Let's make one!

Here is the building process I followed. please note that this is the prototype building so I used steel instead of titanium, but the Ti versions were made using the same process.

Cut the different pieces to size It is the first thing to do, following the plans, cut all metal to size.

You will need some tools: pliers, metal shears, ruler, marker, compass. cut pieces to what they should be. Titanium in 0.5 mm is more difficult to cut than steel sheet of the same size, so plan a pair of good metal sheet shears.

Start assembling and folding. Do that carefully. Remember to plan for the thickness of the sheets, 0.5mm is not insignificant.

And start the assembly and folding. remember to integrate the thickness of the sheets in the plans. Fold only once, as , correcting a fold means breaking the titanium.

The burning chamber The burning chamber is finished and ready for final assembly. The inside wall is on the right, the outside wall and bottom on the left.

The burning chamber (2) Another view of the elements.

Here is the burning chamber before assembly. the prototype showed that more spacers folds are needed around the circumference in order to avoid deformation at high temperatures, and avoid squeezing of the chamber on one side because of temperature dilatation and play.

The chamber assembled And riveted. at the bottom of the inside wall, it is good to plan some folds, at a cm distance, to keep the spacing right.

The chamber assembled (2) Another view.

The chamber once mounted and riveted. It is not obvious to make, but will resist red temperatures easily.

The Shell Now building the outside shell.

The outside shell is made from two disks of 0.8 mm aluminium and one cylinder of 0.5 mm aluminium, as the temperatures in these points are normal (though untouchable) .

Finished, time to test. I am here using a sierra stove foot,to check the prototype, which works.

here it is running!. you will note the burning chamber is directly riveted to the top, which is an error, as it transmits heat, and does not let some air pass through the top. the construction should le 1mm slit between the chamber and the shell, this has also the advantage to centre the flame, and burn the remaining gases.

First try at a foot Not too bad for the first one.

First try at a foot (2) The aluminium fan was quickly replaced by a titanium fan!

And how it snaps in the shell.

The feet are not difficult to make, I do not describe how in details, because there are hundreds of ways to do it that will work. the advantage of the way shown is that idt fits the combustion chamber for packing.

Different Models

The inside of a titanium model

A finished titanium model The aluminium can holder burnt on second try... replaced by a titanium cross.

And how it nicely folds.

Here is one of the titanium models finished. (model #1)(350 grams as shown, including battery)

Another model check the way the burning chamber is "suspended".

And how it folds nicely no space taken in the back pack.

Another finished model (model #2) (320 grams as shown including battery)

And deployed The pot rest bars are titanium.

My own model in it's pot. Conveniently designed to fit in a snowpeak titanium 1400.

My model (model # 3) (380 grams as shown including battery)

Grilling a Hamburger for the kids. Here using charcoal as I had some under hand. But charcoal tend to make the burning chamber very hot.

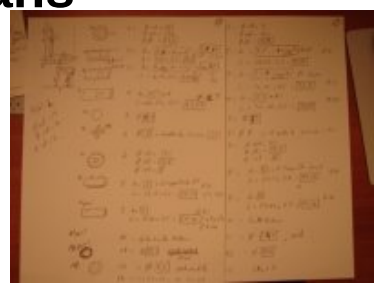
Grilling cassave sticks. As you can see, I made also some experiences in solar power...

Here working. Not even heating water, it is easy and does that very well, but cooking yummy food !

an the last extra small modell Here showing it's alternate power supply! This one piece model did not work very well, because of too thin walls, and was later rebuilt...

Short lived Model #4 240 grams. was later recycled using a one part larger aluminium case and foot, which included the fan, ending at 320 grams.

The crazy man's plans



The plans for the first model As you can see, I think that only the designer (me) can understand these :D

The plans Here are the plans (page one) lucky you if you can decrypt me.

The plans (2) (page two)

The plans. instructions may come later, if there is an interest.

Anyway, be warned, this is advanced DIY, and the building time of one is around 6 hours, but the result is great!

I hope you liked the article.

Post-scriptum :V1 no real plans...