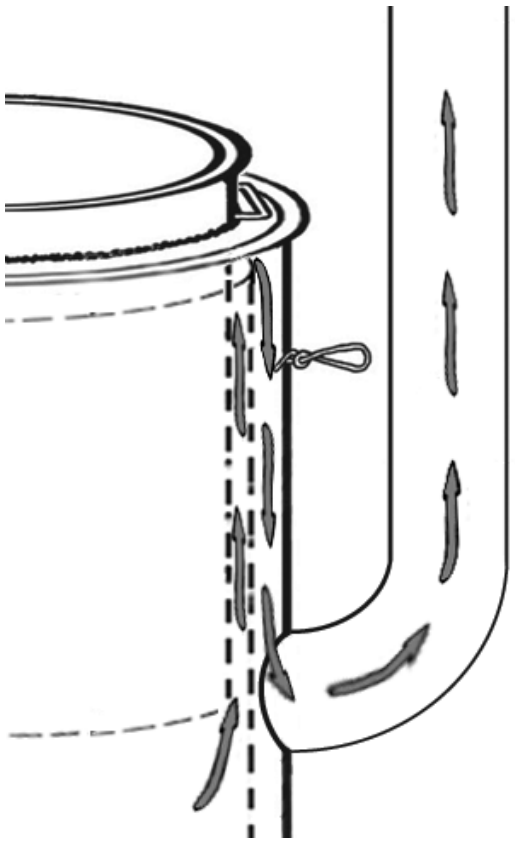
The Institutional Rocket Stove

Designed by Dr. Larry Winiarski

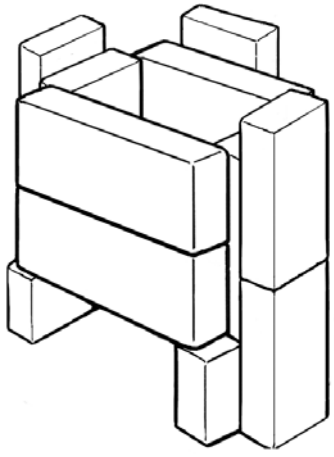
The larger Rocket stoves combine the same strategies that are in the smaller version. A cylinder surrounds the larger pot creating a 16mm gap which is especially effective in transferring heat because the pot is larger. Larger pots have more surface area so greater amounts of heat pass into the food. In fact, using larger pots decreases the amount of fuel used and helps to reduce the emissions made when cooking.

When a chimney is attached to the stove, the hot gases are forced to flow down another gap on the outside of the inner cylinder (as in the Institutional VITA stove). In this way adding a chimney to the stove does not diminish the fuel efficiency. All of the heat has already scraped against the pot before it exits out of the chimney.

The light weight bricks used in a larger stove can be thicker and larger than bricks used in a 20 liter stove. There is a bigger space under the larger pot so larger bricks can be used to make a larger combustion chamber that will burn more wood. The larger pots require a larger fire to bring water to a boil quickly. All the parts of the Institutional stove are bigger to match the size of the pot. The Institutional Stove in the following drawings can handle pots from 100 to 300 liters. Please use the worksheets in Appendix C to create stoves matched to different sized pots.

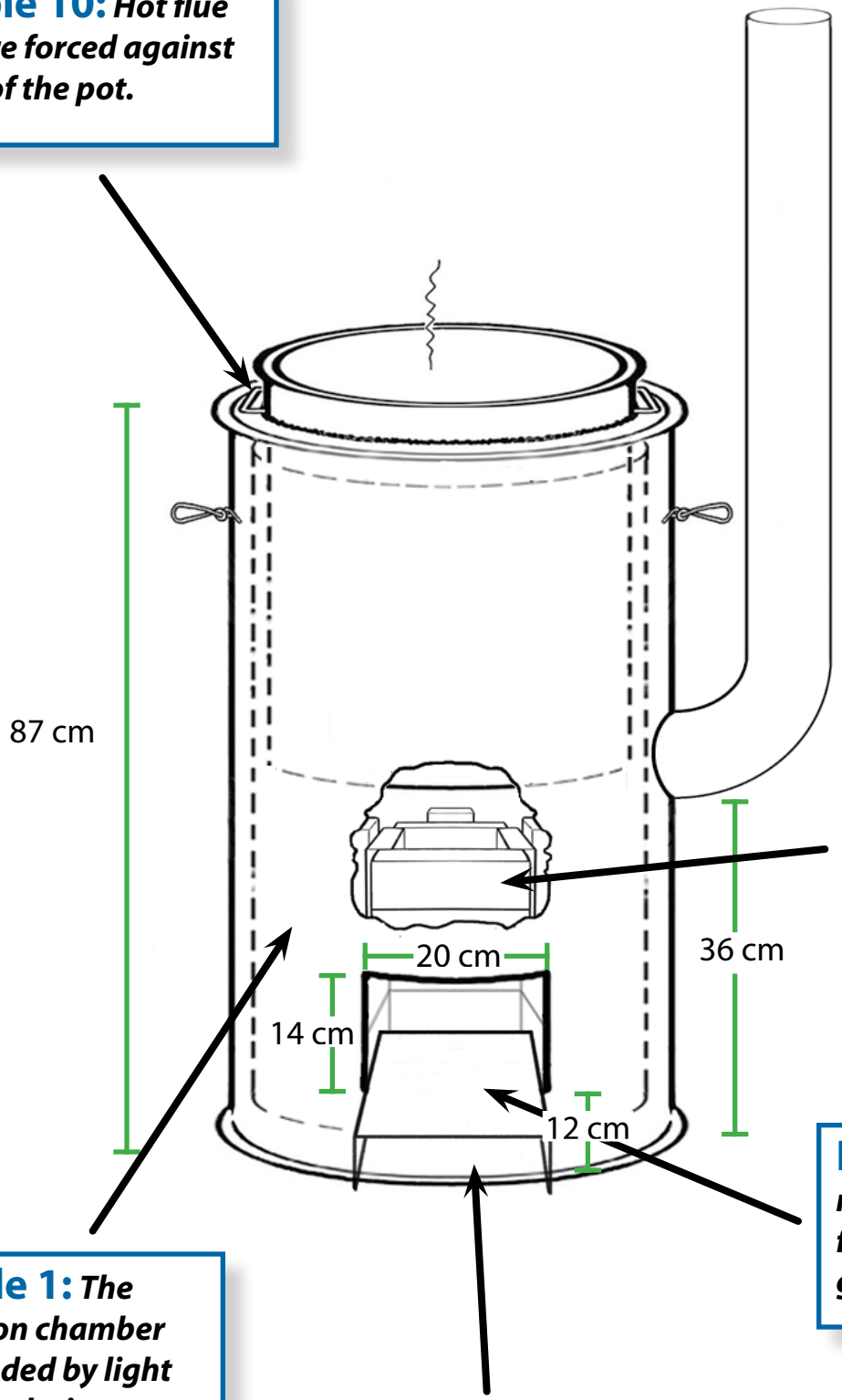


As with the VITA stove, heat is forced to scrape against the sides of the pot before passing down the outer channel and out the chimney.



An insulated combustion chamber made from light weight refractory bricks helps to reduce harmful emissions

Principle 10: ***Hot flue gasses are forced against the side of the pot.***



Principle 3: ***The combustion chamber is a small internal chimney made from insulative refractory bricks.***

Principle 1: ***The combustion chamber is surrounded by light weight insulative material.***

Principle 9: ***A metal shelf holds fuel off of the ground.***

Principle 6: ***Primary air is pre-heated by entering from below the combustion chamber.***

The Institutional Rocket Stove

Instructions for Building

Materials Needed:

Tools - tin snips to cut the metal, a drill or punch to start holes.

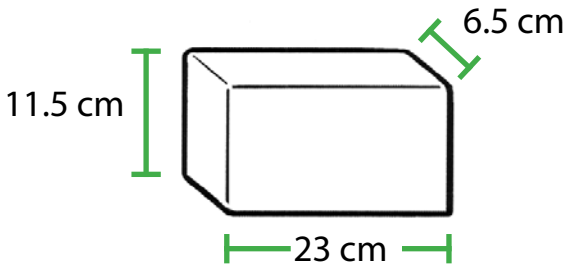
Stove Body - Two large pieces of sheet metal.

Combustion Chamber - high fire clay, low fire clay, cement, water, sawdust, and wood or metal for making a mould.

The Combustion Chamber

Step 1

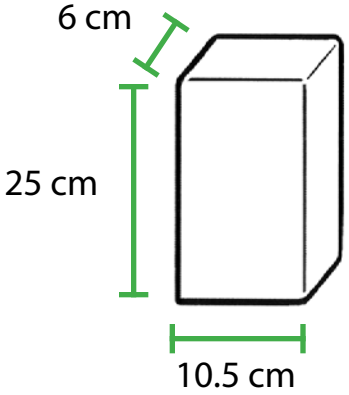
The bricks used are 23 cm x 11.5 cm x 6.5 cm in size. The brick in back of the combustion chamber is a heavy ceramic brick used in construction. A heavy brick will not be damaged by sticks hitting the surface.



Insulative "lightweight" ceramic bricks

Step 2

All of the bricks used in this larger combustion chamber are lightweight insulative ceramic bricks. The inside of the combustion chamber is 34.5 cm tall, 23 cm wide, and 11.5 cm deep.



Regular "heavy" ceramic bricks

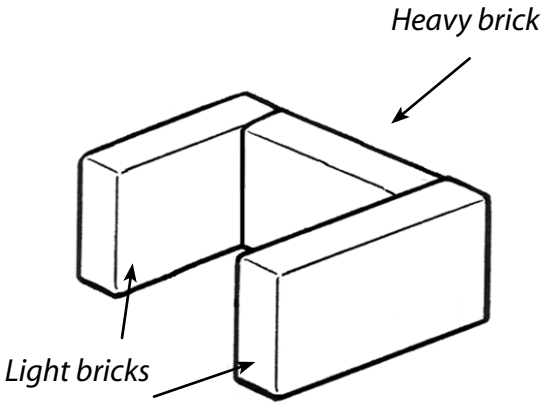
Step 3

Six heavier bricks are used as pot supports. The pot cannot rest on the lightweight insulative bricks because they are not strong enough to hold up such a heavy pot full of water and food.

The pot supports are 50 cm high. This makes them 15.5 cm taller than the combustion chamber.

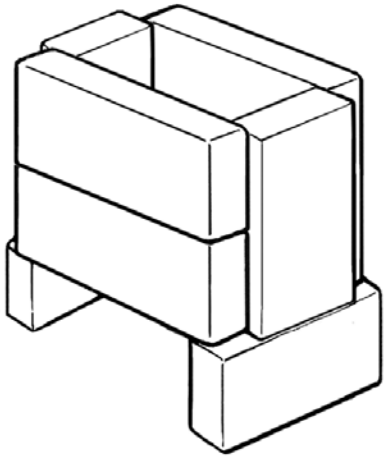
Step 3

Place the heavy brick as shown between two of the longer bricks. This heavy brick is used so that sticks pushed into the combustion chamber will not cause damage.



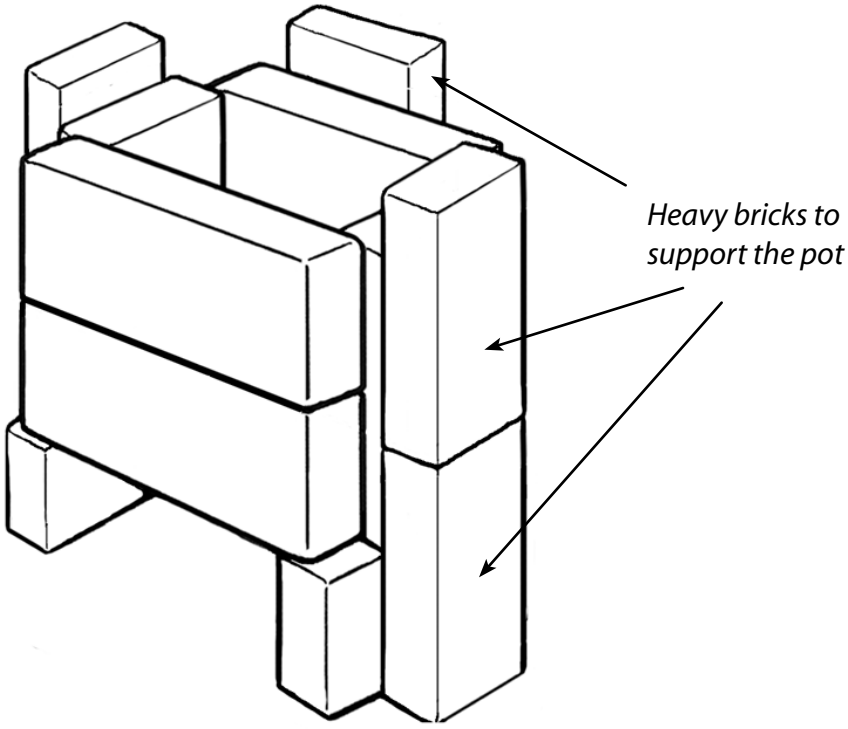
Step 4

Place one shorter and one longer light weight insulative bricks as shown on top of the three bricks below them.



Step 5

Finish the combustion chamber as shown using all the remaining bricks.



Finished combustion chamber using all 11 bricks

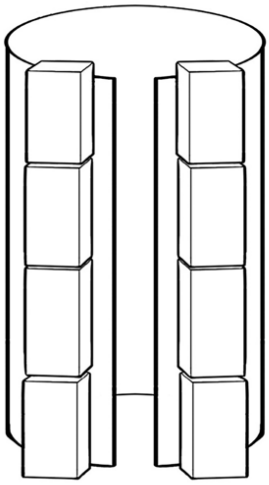
The Stove Body

Step 6

The combustion chamber with pot supports is 50 cm high. The pot should be submerged at least 40 cm into the open cylinder which forces the fire and heat scrape against it.

In this case the cylinder is 87 cm high. The open cylinder creates a 16 mm gap all around the pot.

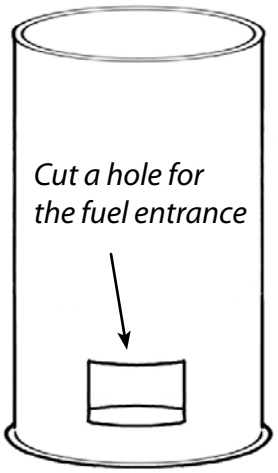
Stacks of bricks are used to fill the space between the outside of the open cylinder and the inside of the stove body as shown.



Step 7

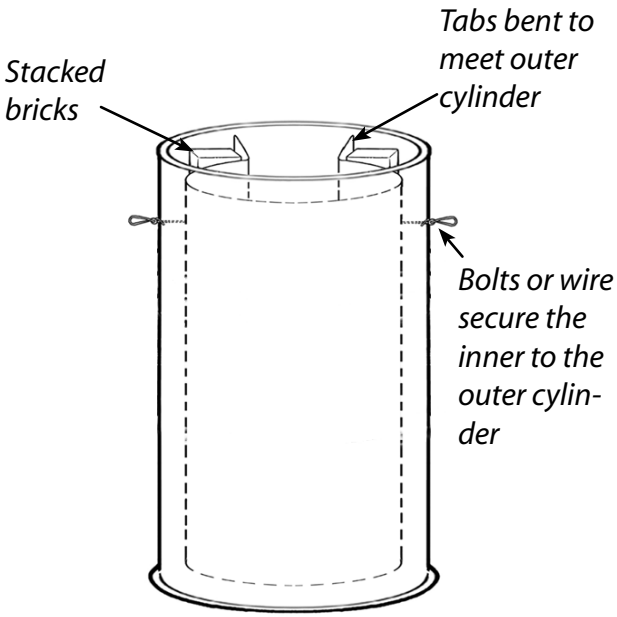
An opening is cut into the outer body of the stove. The outer body of the stove creates another 16mm gap all around the inner cylinder surrounding the pot.

The fuel entrance is 20 cm by 14 cm. It is 12 cm above the bottom.



Step 8

The inner open cylinder is secured inside the body of the stove with bolts or pieces of wire. The connections create an even gap between the outside of the open cylinder and the inside of the stove body. Use as many connections as needed to create an even gap.

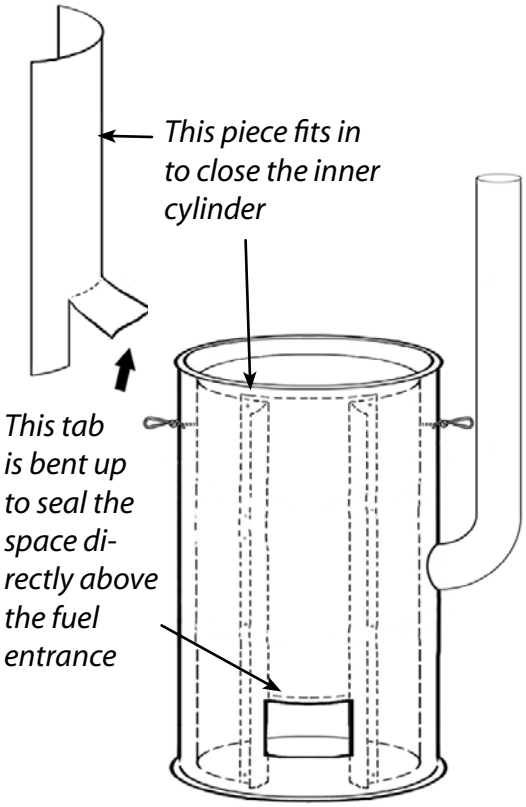


Step 9

The inner cylinder is now secured inside the stove body.

A piece of sheet metal is cut to fill the open space in the inner cylinder and to seal the space above the fuel entrance. Screw the piece in place.

The chimney is attached to the outer body of the stove. The fire and hot gases are forced to scrape against the pot in the 16mm gap between the pot and the inner cylinder. Then the hot gases flow down the outer mm gap to the chimney. In this way only 'waste heat' leaves the stove.



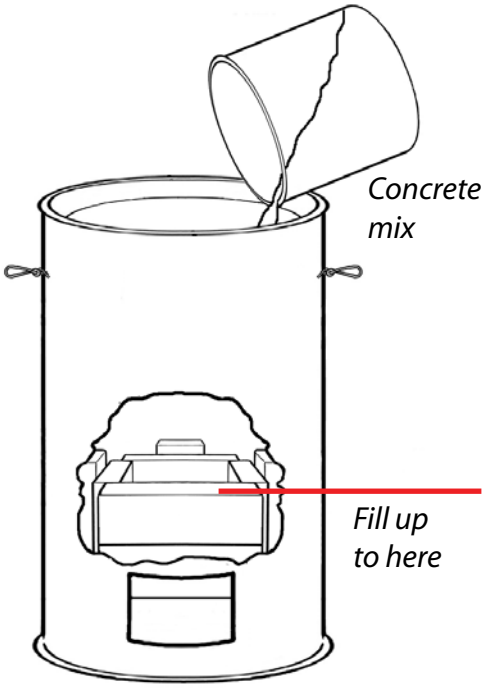
Step 10

Mix together enough concrete to fill between the outside of the combustion chamber and the inside of the open cylinder. A strong recipe for making concrete is:

1 part sharp sand,
2 parts cement,
3 parts coarse gravel.

Mix the dry ingredients together and then add water. Do not make the concrete mix too wet or "soupy".

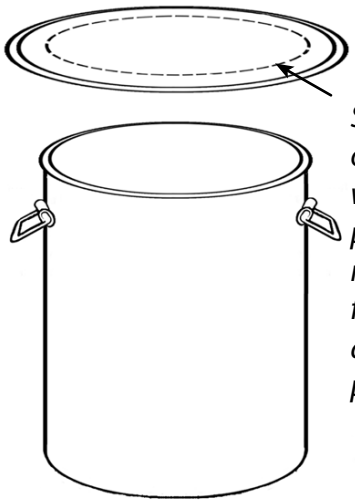
Fill up to the top of the combustion chamber made from lightweight bricks. The tops of the pot supports, made from heavy brick are 15.5 cm higher than the cement. A space is needed so fire and hot gases can flow under the pot and up the sides of the pot as well.



Step 6

If the stove will be used without a chimney fill between the inner cylinder and the stove body with insulation. Use wood ash, pumice rock, vermiculite of perlite. Insulation needs to be as light as possible.

If a chimney will be used cut out a top for the stove that fits tightly around the pot and also seals around the stove body so that smoke cannot escape. Since the smoke cannot leave out of the top of the stove it is forced down the gap between the inner cylinder and the stove body where it exits out of the chimney.



Seal the top of the stove with a circular piece of sheet metal that fits snuggly around the pot

Step 7

Using this type of stove usually surprises cooks who have used a lot of wood in open fires. This type of stove uses less wood and is quicker to boil. Also the insulation in the combustion chamber helps to burn up smoke that used to escape.

A shelf in the fuel entrance helps as well to feed wood at a controlled rate into the fire. In this stove the shelf was wide, high, deep.