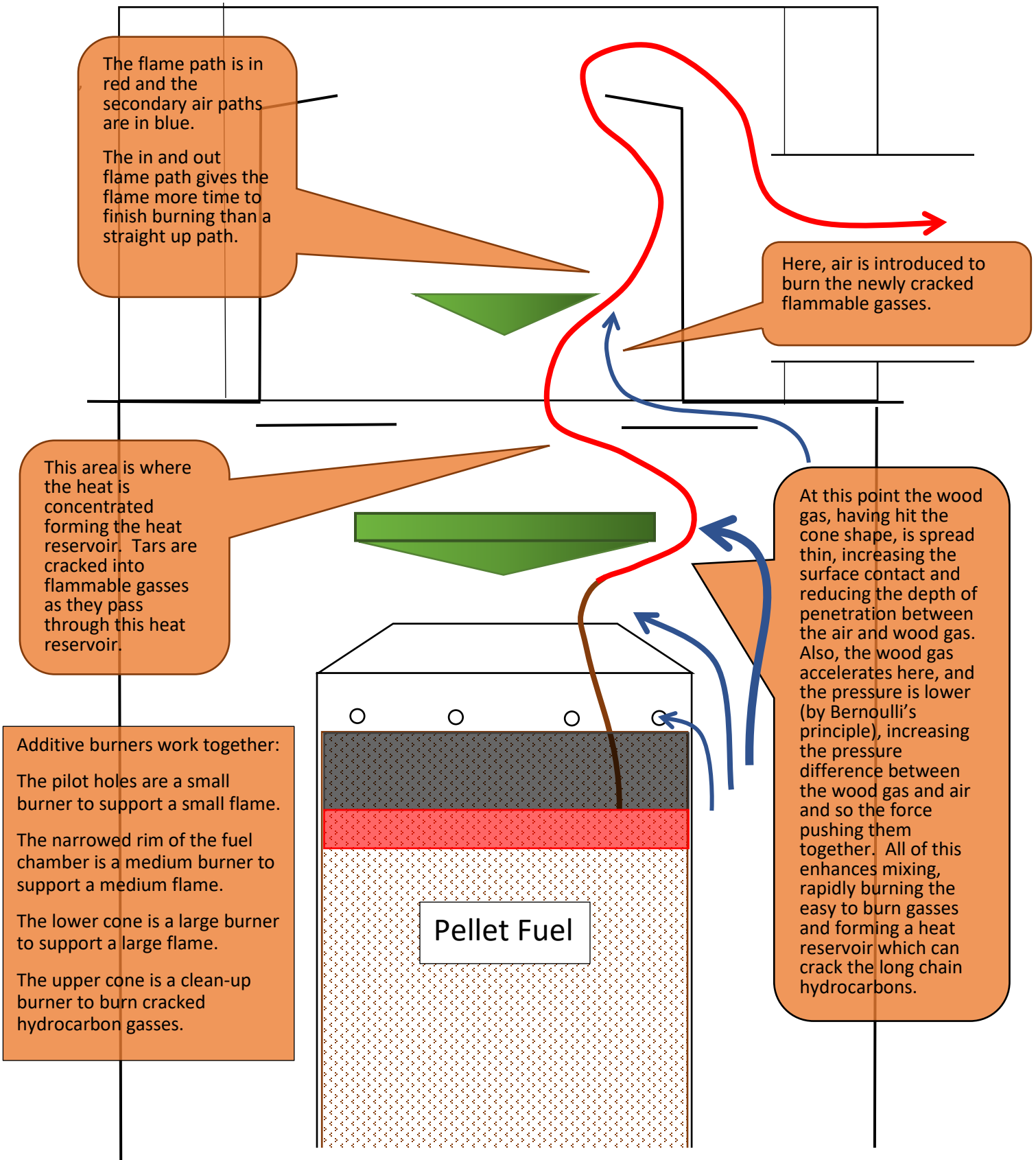
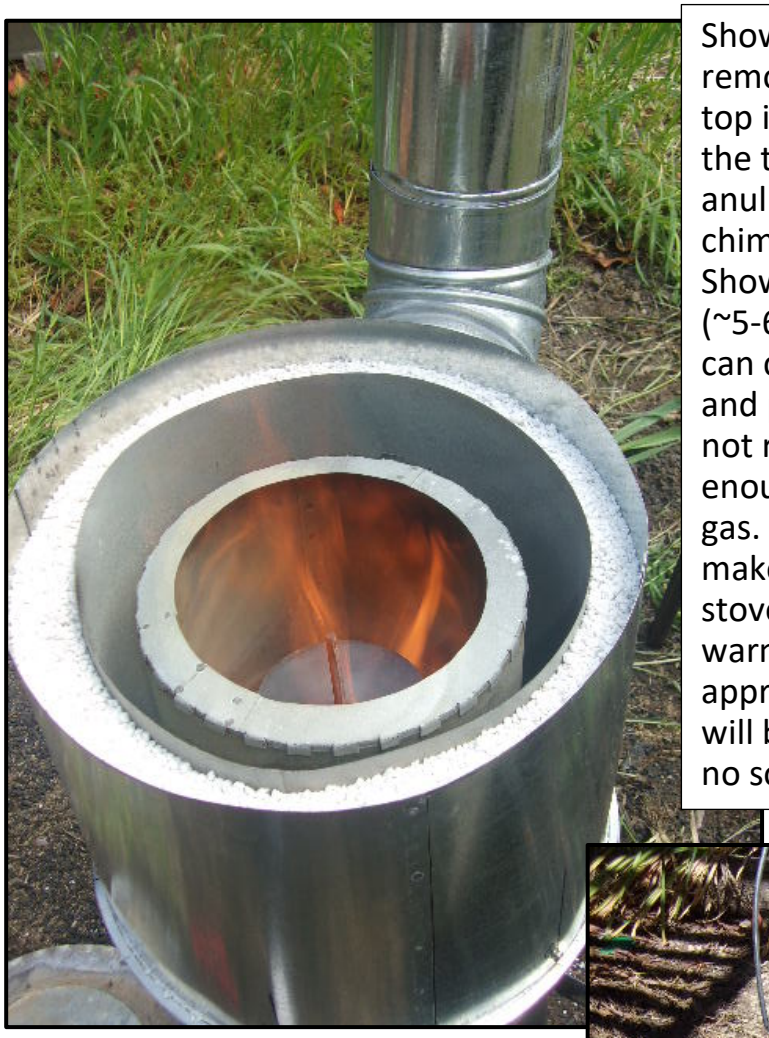
# Three Hour TLUD

This stove was designed to give a three hour burn time at a power level of 5 to 6 kw. It sends the exhaust out the side for use in an existing plancha for a project in Guatemala. It can be modified for a pot stand or griddle to cook on top of the stove itself.



Proper testing at Aprovecho has been delayed by Covid 19.





Shown is the combustor with the top removed to show the flame. With the top in place the hot gasses will go over the top of the inner cylinder, down the anulus opening and out through the chimney.
Shown is a moderate power level flame (~5-6 kw). Increasing forced primary air can considerably increase the flame size and power level. Forced secondary air is not required because the burner is good enough that it can burn the extra wood gas. Too much forced primary air can make a flame so hot it could damage the stove, and yet produce no smoke to warn the cook. A small fan is appropriate. The proper size for the fan will be determined at Aprovecho. Note no soot on this third burn in the stove.

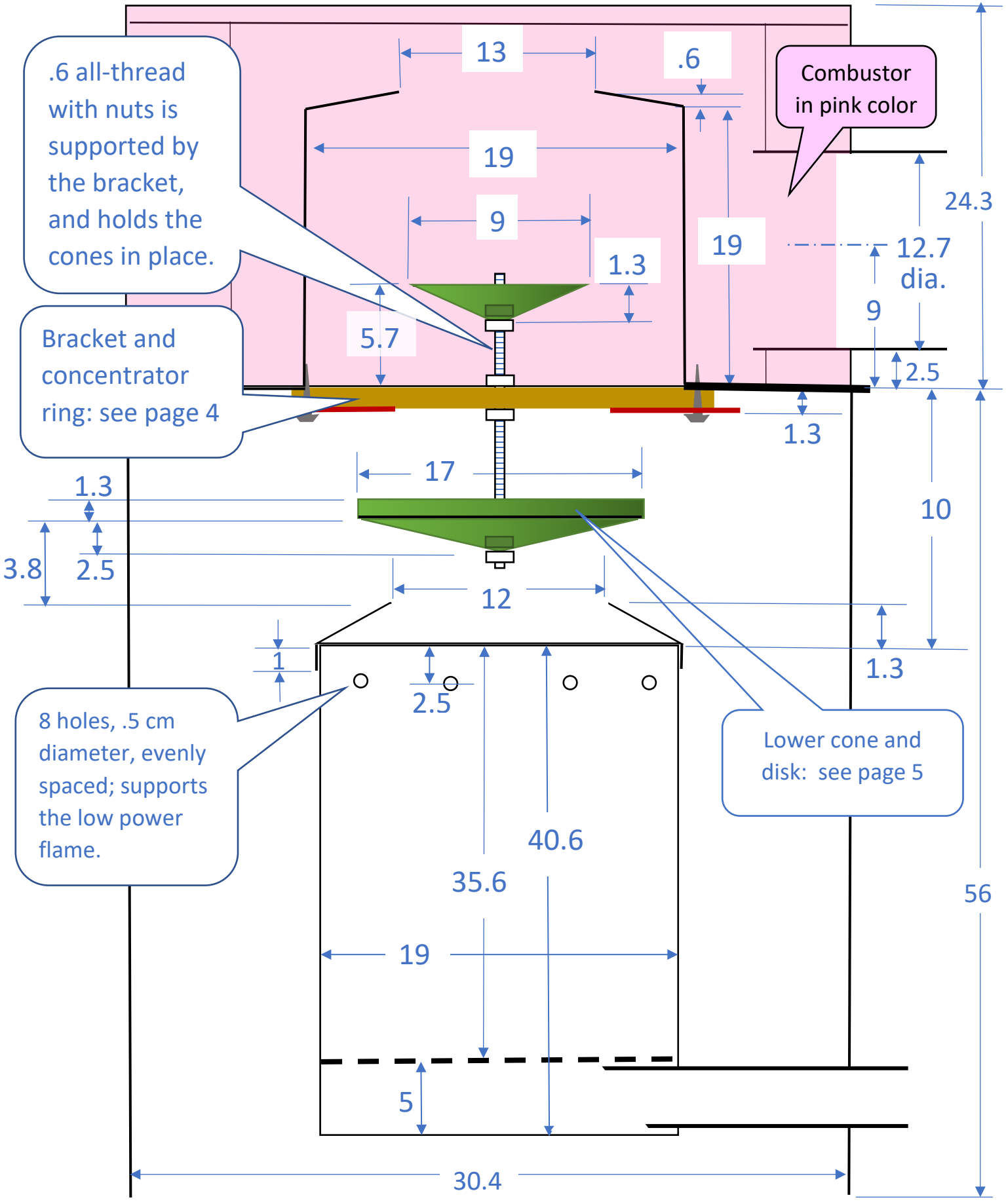
This view shows the entire stove. Visible are the chimney connector (Designed to feed an existing plancha for a project in Guatemala), the secondary air entrance holes, the primary air control lever, and the small plastic fan I am using for forced primary air testing.

Fuel type: soft wood pellets
Fuel load: 7 kg (15.7 lb)
Burn time: 3 hr 11 min
Power level: ~6 kw
Smoke: none
Soot: only nonflammable ash
Char: saved, not burned
Turn-down: stable from low natural draft to high forced primary air

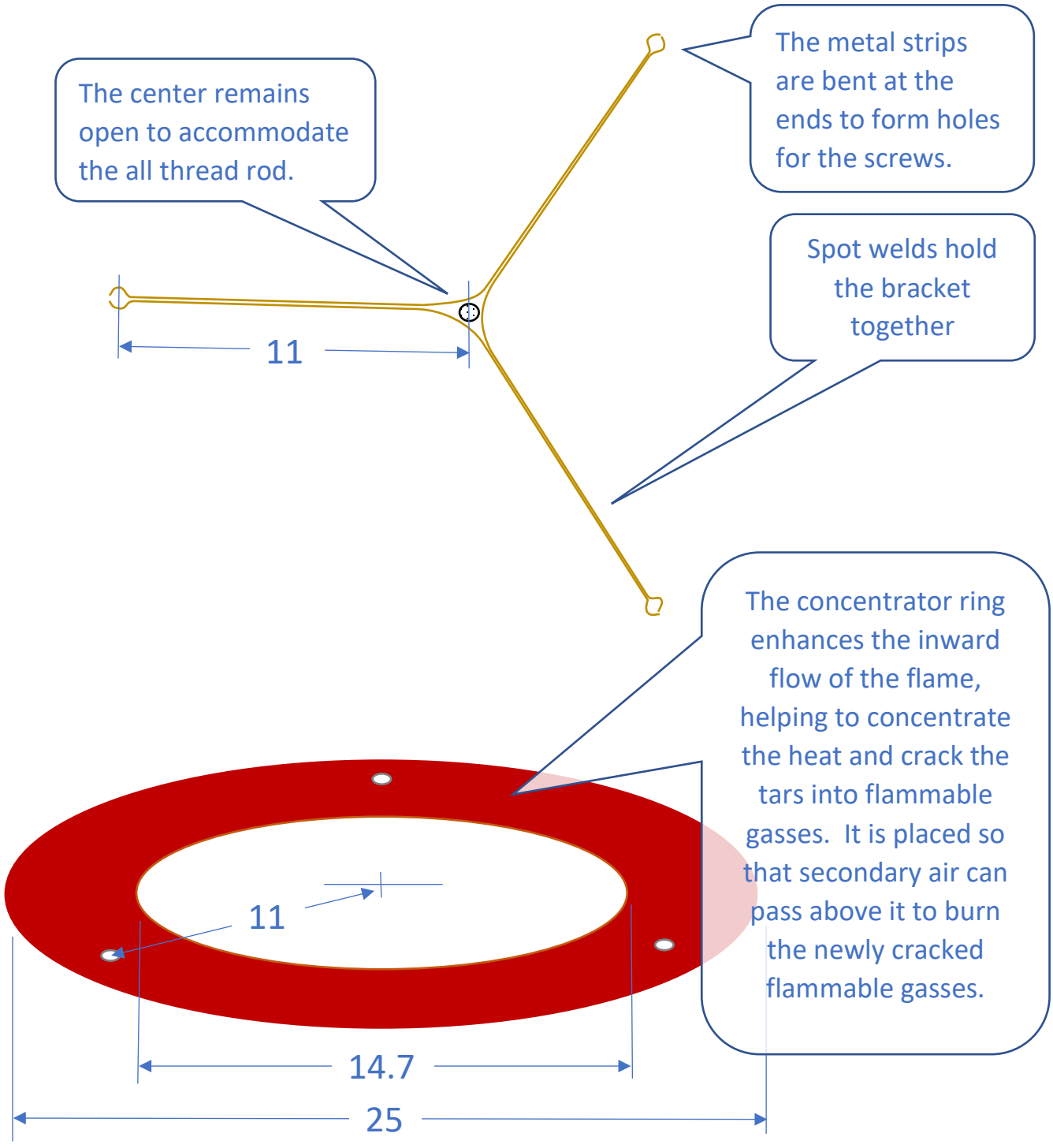
# Dimensional Drawing

Measurements are in Centimeters

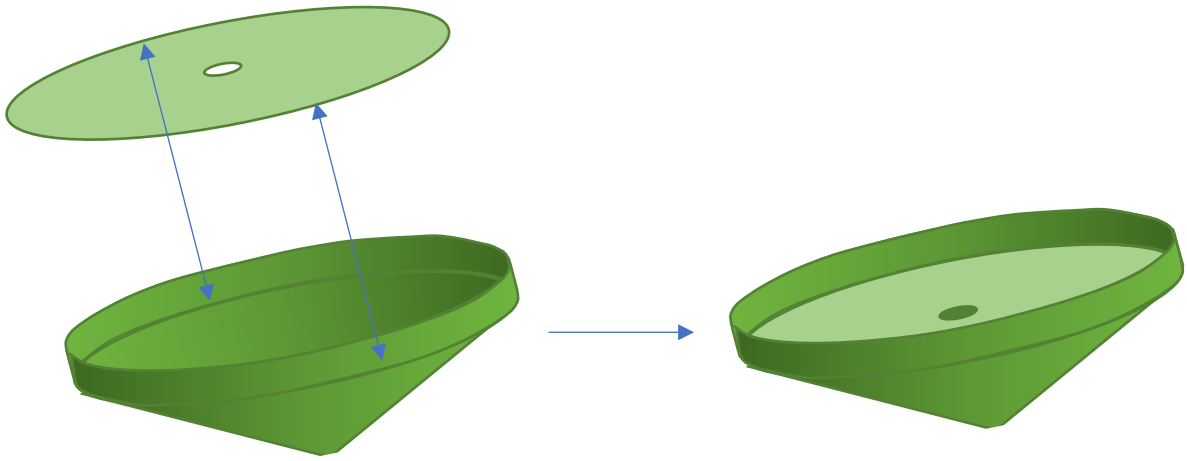




The bracket is made of three strips of 1.3 cm wide, sturdy stainless-steel sheet metal. The screws that hold this bracket to the combustor also hold the concentrator ring 1.3 cm below the combustor, with the bracket acting as a spacer.



It is very important that the lower cone remain level to avoid a one-sided flame. It is supported by a disk to keep it straight. The disk may be mounted adjacent to the cone or at the top of the short cylindrical section.



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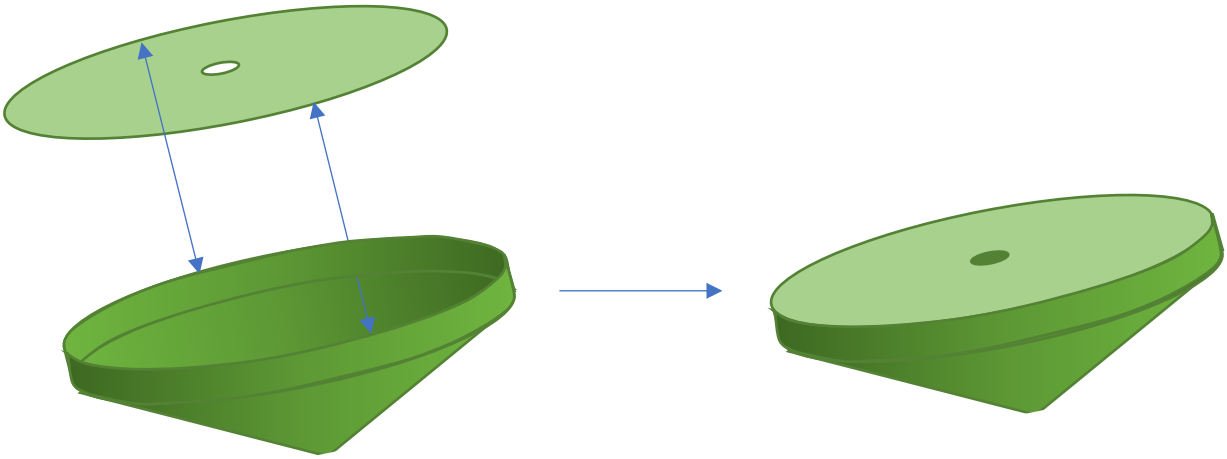
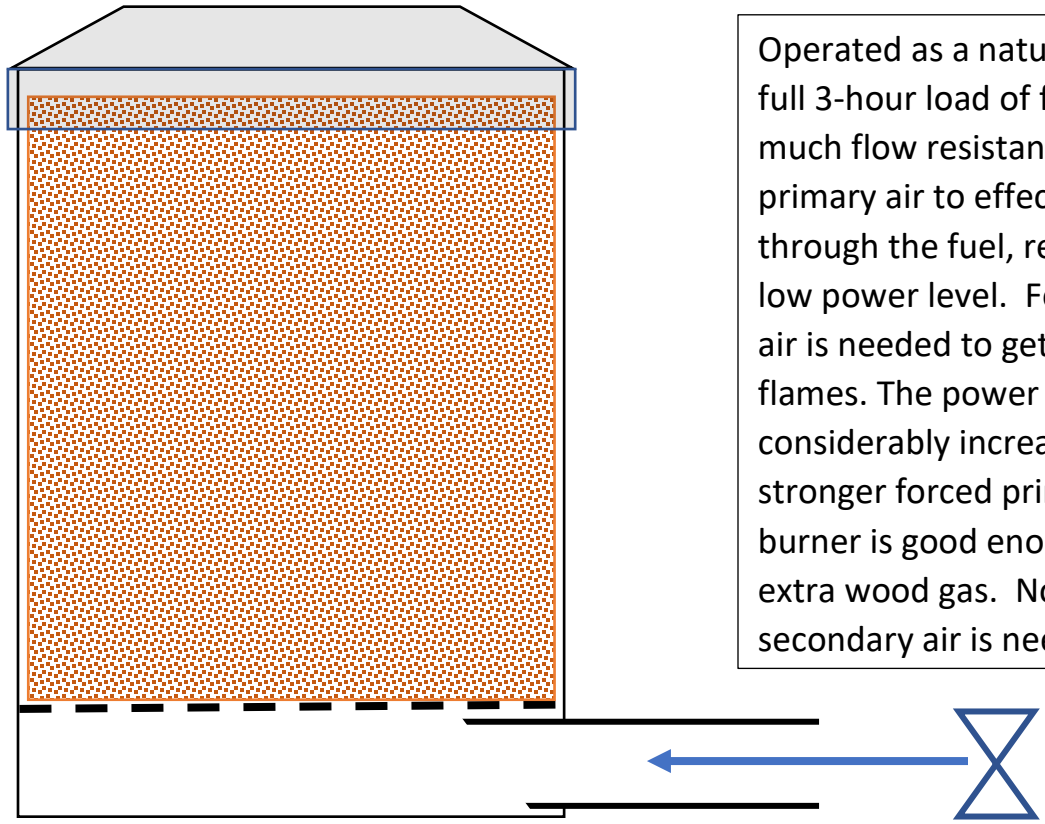
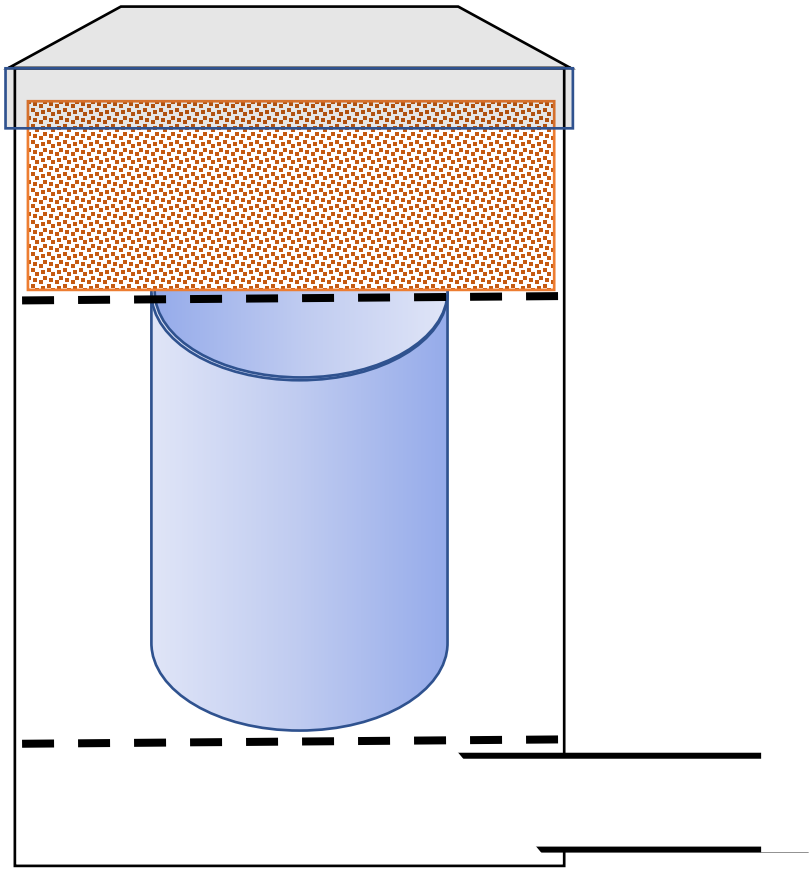


This part can be made of a ceramic for a longer life span

The best conditions for mixing the wood gas and secondary air are at the outside edge of the cone. The short cylindrical section holds the wood gas at that best location for a longer time to increase mixing.



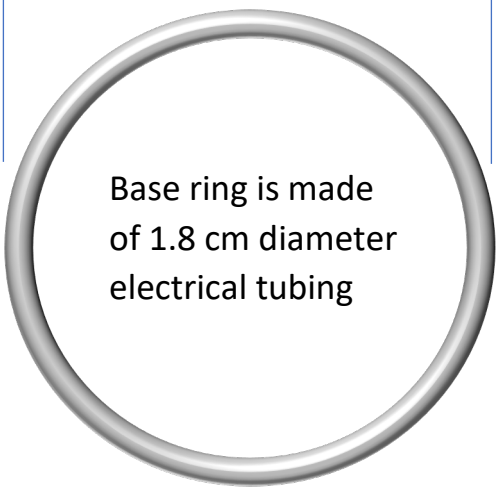
Operated as a natural draft stove, a full 3-hour load of fuel will have to much flow resistance for the primary air to effectively rise through the fuel, resulting in a very low power level. Forced primary air is needed to get higher power flames. The power level can be considerably increased with stronger forced primary air. The burner is good enough to burn the extra wood gas. No forced secondary air is needed.



A smaller fuel load can be operated as natural draft; the fuel must however be raised to the top of the fuel chamber on a raised grate. A simple grate and support stand system works well for this.

A small load of fuel at the bottom of the fuel chamber allows the gas to cool, and burns dirty with no turn-down.

Fits snugly into the outside skin of the stove.



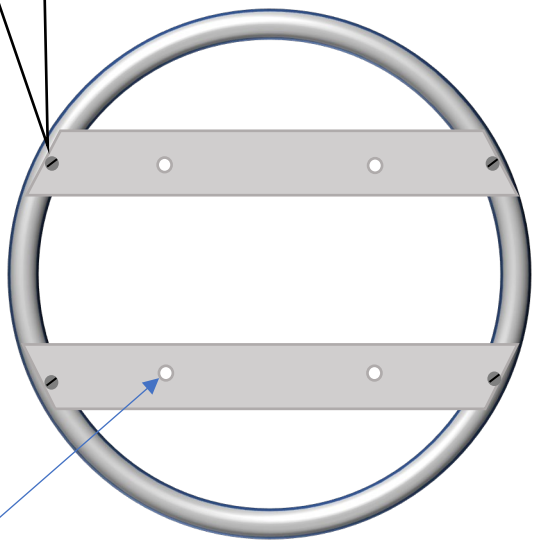

Top View

Side View

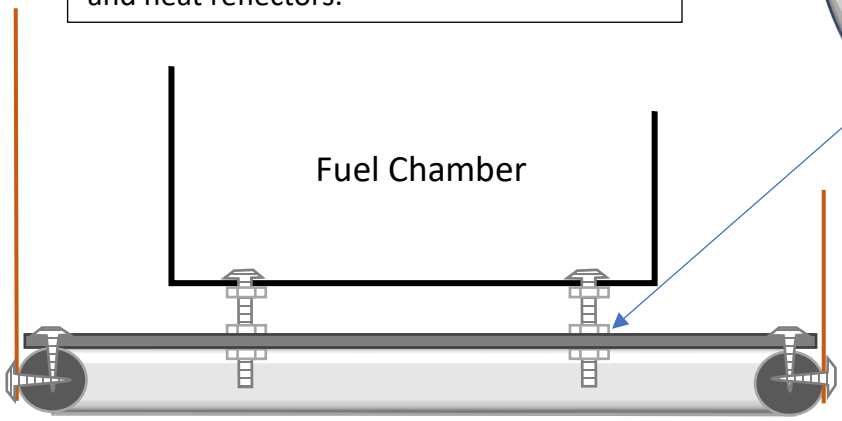
## BASE AND FUEL CHAMBER MOUNT

The base ring fits snuggly inside the outside skin of the stove and is attached to the skin with screws. This gives strength to the bottom of the stove. On top of this ring are attached two sturdy metal strips with holes drilled for the screws attached to the bottom of the fuel chamber to pass through.

Attach with screws or weld

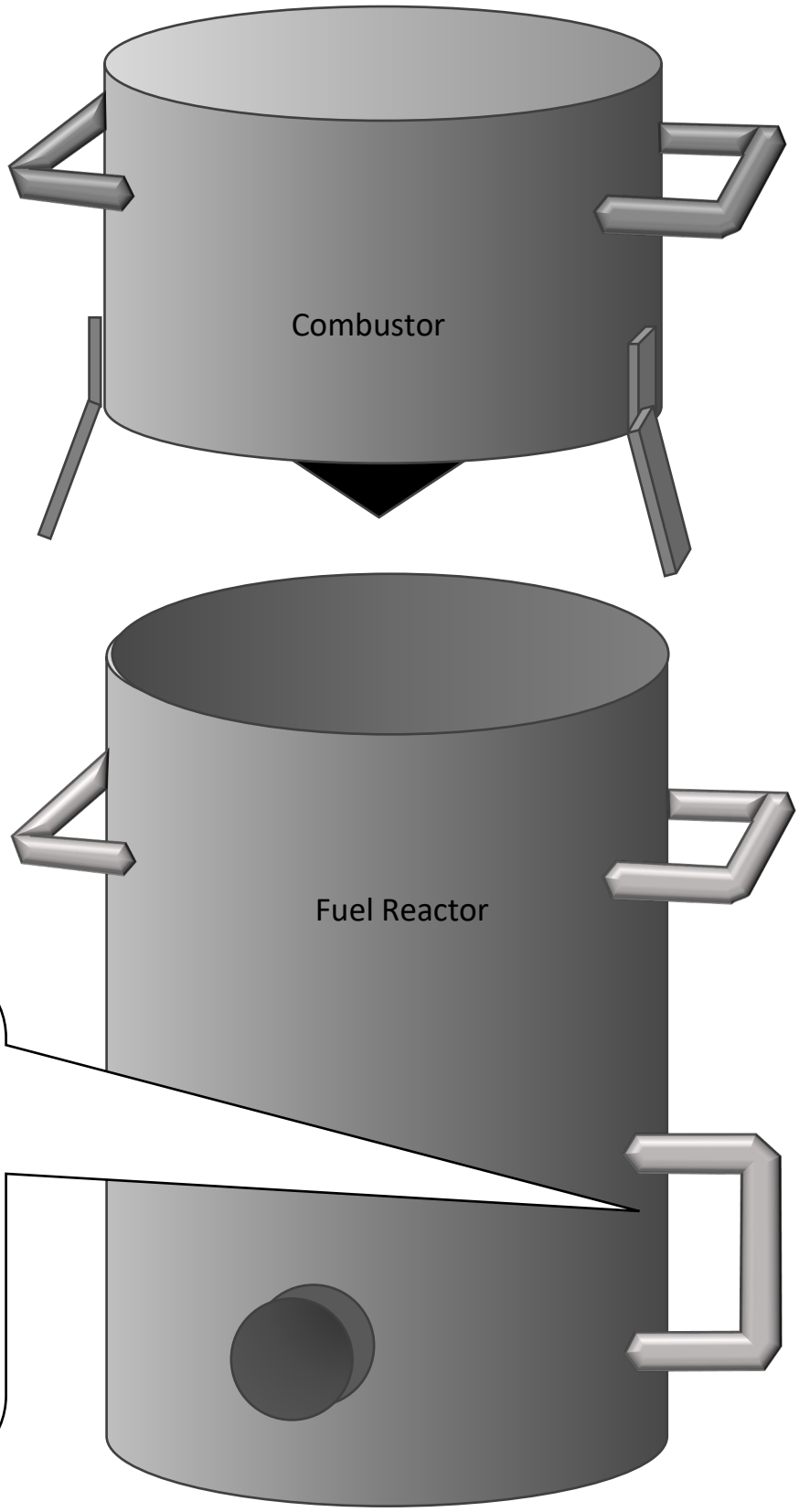


Four Machine screws support the fuel chamber on top of the base ring. This arrangement allows the fuel chamber to be adjusted up and down, and angled to be centered in the stove. Mounting the fuel chamber at the bottom keeps the sides of the chamber free of mounting brackets, allowing simple installation of insulation and heat reflectors.




The base ring strengthens the stove bottom and acts as a sled so the stove may be slid on the ground to disconnect it from the plancha for emptying and fueling.

The old stove needed to have the combustor held above the fuel reactor while starting the fire. This stove does not need this, the combustor can be put down on the fuel reactor immediately upon igniting the flame. The legs need to be tall enough to give clearance to the cone when the combustor is set on the ground, and angled to center the combustor as it is placed onto the fuel reactor.




The lower handle makes it easy to turn the stove over to empty the char. Lifting the whole fuel reactor is safer than removing and handling the hot fuel chamber, since all hot parts remain insulated inside, lessening the possibility of burning someone.

An alternative to the legs is this design which adds a shield that protects the stove body and helps keep the handles cooler.