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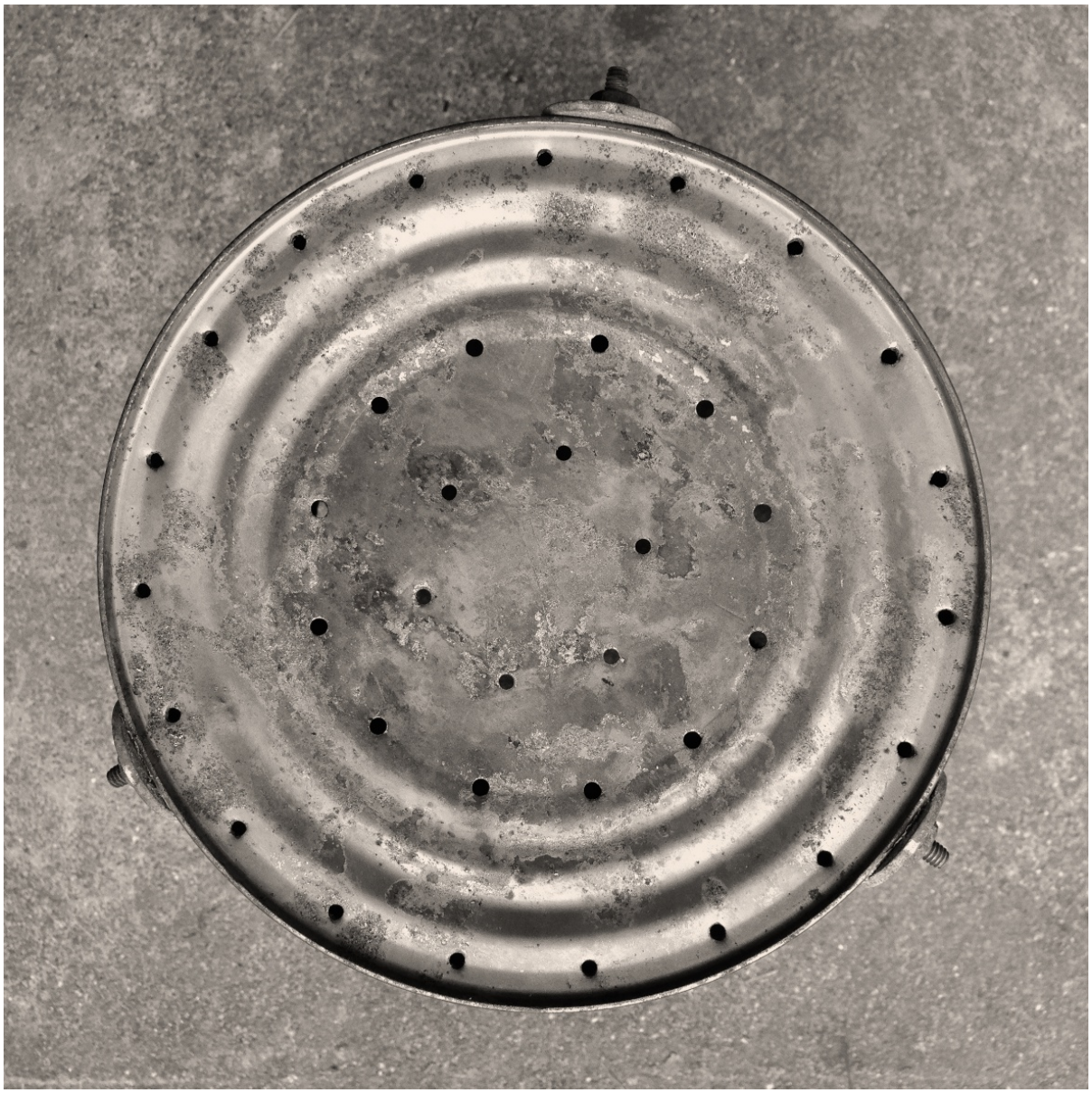
iCan in a Trash Can

Most recent iCan developments

The current state of my work with iCans is represented in the following photos and notes.

The above two photos show the natural draft iCan TLUD configured to boil water in the Swiss Volcano Stove manner: pot set into the exhaust gas stream with thermal energy applied to the sides and bottom of the water container.

Note: The Trash can serves three functions: 1] safety can to contain any spilled hot coals & keep finger away from the very hot reactor can; 2] wind whiled to protect the fire from being blown out by a gust of wind; 3] preheat both the primary and secondary air.



The bottom of the reactor can. The primary system is set up for dry wood pellet fuel. It can be modified to work with other fuel types. Ideally, the primary system would be on a plate that could exchanged as power levels and fuel types required. Increasing the primary air, for example, will create a hotter & faster pyrolysis if heat is the primary goal.

The holes in the outer and inner ring are 7/64s. The middle ring has holes made with a 1/8th inch bit. The design goal was a well balanced combination of: thermal energy output; carbon harvest amount & quality; run time; and quality the stack gases emitted.

View into the empty reactor can showing the flame retention plate. The diameter of the plate is 3 inches, or half the diameter of the reactor. It covers about 25% of the pyrolysis surface. It has three functions: 1] help to keep oxygen out of the pyrolysis zone; 2] force the syngas towards the incoming secondary air at the edges; 3] form the bottom of the combustion chamber. This plate sits just below the 3/8ths inch secondary air ports and about 2 inches below the top of the reactor. These values should be taken as departure points.

This shows the bottom of the middle can. The deflectors are 2 inches in diameter. They obscure about 33% of the diameter of the reactor and form the top of the combustion chamber. When installed on top of the reactor can, the depth of the "combustion chamber (zone) will be about 2.75 inches. The majority if the combustion of the syngas will take place in this chamber. The flames will swirl and snap and stay mostly in a horizontal plane between the flame retention plate and the three deflector washers.

The final draft enhancing can has been added to complete the system. You can see the use of three small washers to create the air gap for the secondary air. Three larger washers at the base of the other cans helps to lock them into position and to prevent them from falling off the stack. Note also the 3/8th inch secondary air holes. The bottom rings has 29 holes and the top rings has 9. I find that multi level secondary air works better than a single layer.

In practice, I load the reactor can, add starter, place the flame retention plate on its three supports. Then I place the prepared reactor in the trash can. The next step is to light the starter

- usually gelled alcohol. Lastly the top two cans are set in place. About 5 - 7 minutes latter I am ready to cook.

In a well tune iCan TLUD, very little soot will be deposited on a "pot" used to boil water. The "haze" on the bottom of the can above is mostly a light varnish of creosote that washes off easily. Soot on pot bottoms indicates incomplete combustion of the the carbon monoxide in the syngas. For the most efficient use of the syngas, soot should be avoided.