

Dual Fuel Gingery Type Furnace

Part 2 By Inthesticks

Re: Dual Fuel Gingery Type Furnace

« Reply #42 on: July 09, 2016, 03:16:45 PM »

That looks great!

Could you do a separate, quick thread on the manometer perhaps? I'm sure a couple of us are a little curious about that as well.

Re: Dual Fuel Gingery Type Furnace

« Reply #43 on: July 10, 2016, 01:56:37 AM »

Thanks for your interest LibbyHillBrewer. The manometer I put together is pretty rough, I just wanted to verify I was in the ballpark on this fan. If I build a proper one in the future I will certainly do a write up on it. In the meantime if your interested I made up a PDF which is from D. Gingery's book "How To Design @ Build Centrifugal Fans For The Home Shop". It will show you how to build one and explain the readings.

Cheers

CB

Re: Dual Fuel Gingery Type Furnace

« Reply #44 on: July 10, 2016, 02:47:49 AM »

Well I did manage to finish the dual fuel burner today. The design is virtually the same as Lionel Oliver's "Hot Shot"(1st picture). Mine is one size larger 1 1/4" instead of 1" burner pipe he also used 1/8" black iron pipe for oil injection I used 1/4" brake line tube, and total length is about 3" longer. In a later version he extends the oil pipe to the end of the burner pipe which I did here. I did not have a 2" nipple long enough for the blower pipe and my pipe dies stop at 1 1/2" so I welded 1/2 a close nipple to the end of a 2" pipe.

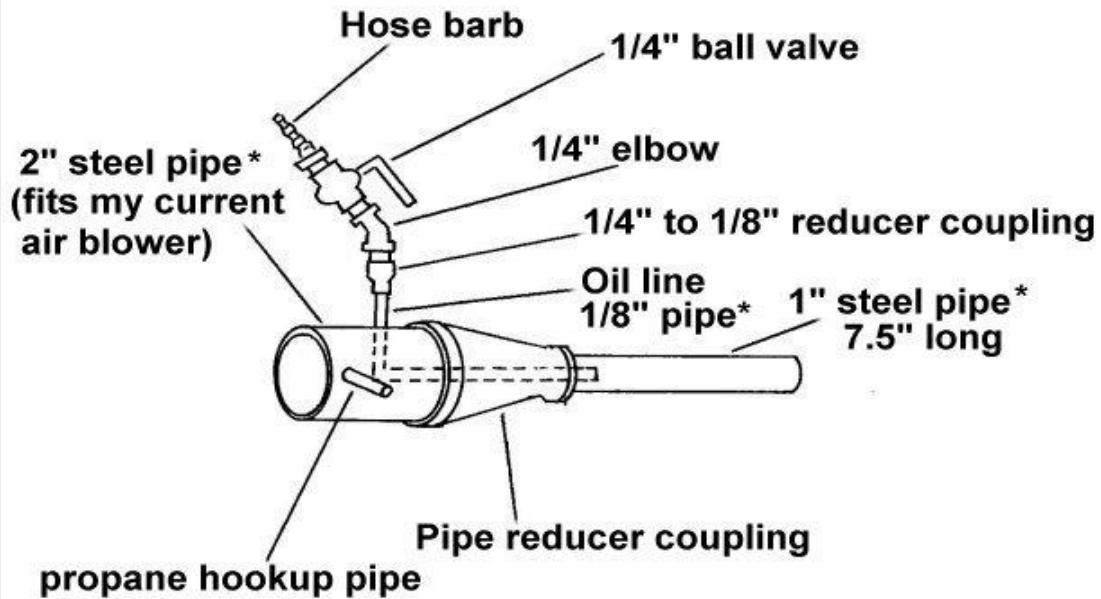
Hey!! it worked 🍻🍻. I resisted welding the oil delivery pipe to the blower pipe, threading it instead so that if I need to make changes in the future, it can all be dismantled. Both oil and gas have needle valves for positive control and quick connect fittings.

Cheers Modders



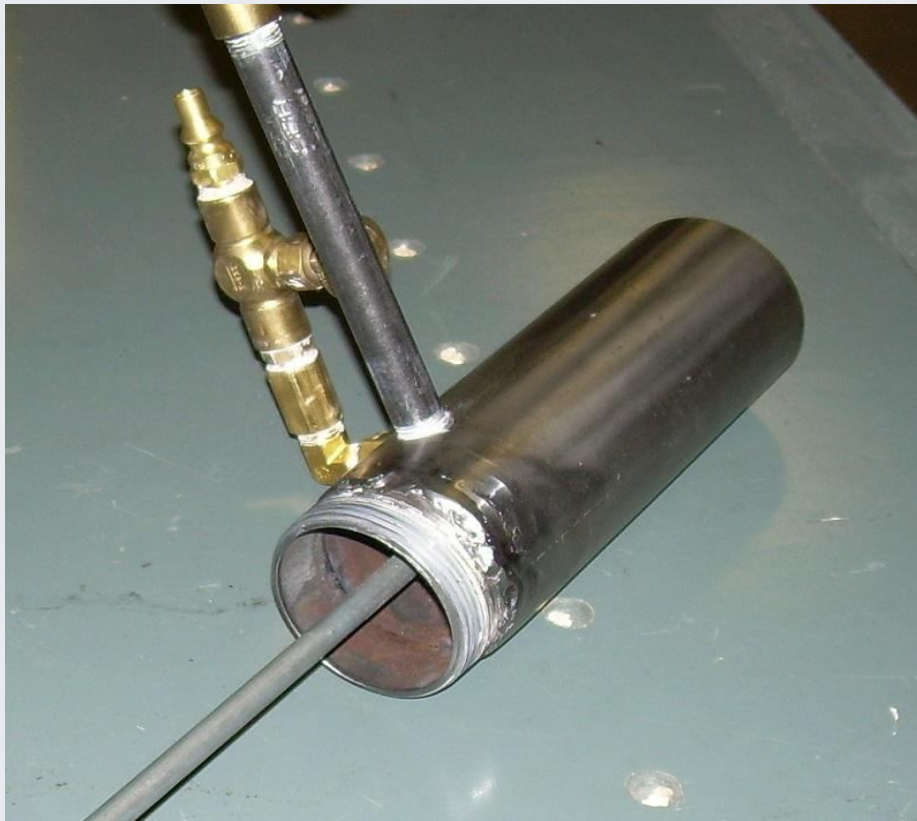
CB

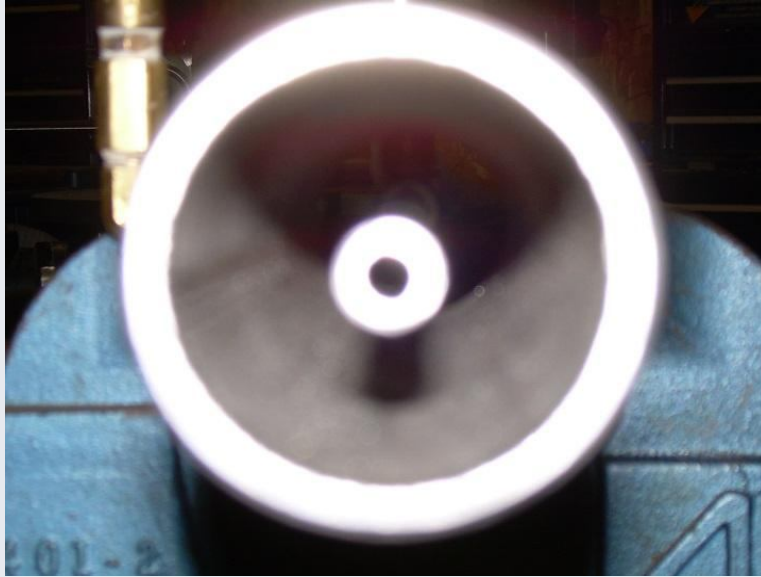
"Hot shot" waste oil burner (fuel injector) version 1 ~Sept./13/2007

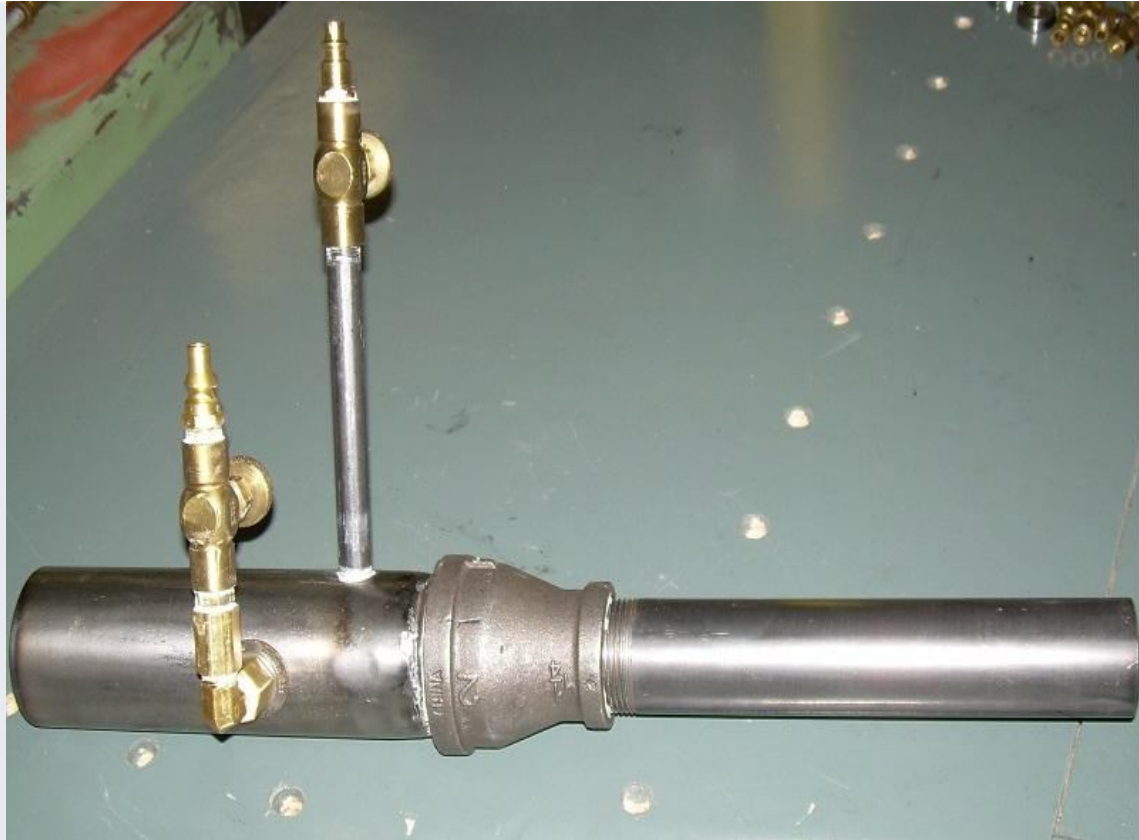


* Pipe diameters are American nominal sizes, not actual measurements.
For example, 1" pipe is not actually 1" diameter it's just called 1"...

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Re: Dual Fuel Gingery Type Furnace

« Reply #45 on: July 10, 2016, 06:43:26 AM »

On manometers.

Many years ago, when I was working in the maintenance dept of our local chicken

processing factory, one of our gas fired boilers developed a problem. It would start ok, but when it tried to switch from start to run it just cut out. The electrician couldn't find any electrical problems. I suspected the gas supply. So I made up a crude manometer using about ten foot of 10mm bore clear plastic pipe. I fixed it to a length of plank so that it formed an elongated 'U', added water until the water level was about half way up the pipe (naturally on both sides of the 'U'), and connected one end of the pipe to a spigot on the side of the gas supply pipe.

A mark was made on the board coinciding with the level of the water.

And the boiler was switched on.

At first the gas pressure showed, as expected, a positive pressure, not much, about 2" of water if I remember correctly. But when the system tried to go to 'run' the pressure dropped back past the original mark. In other words it was, briefly, pulling a slight vacuum. And there was the problem.

A gas boiler system must never have a negative pressure in it as there is the potential to draw in air. This can lead to an explosive gas/air mix. So the electronics detected the negative pressure and shut the system down.

For very low pressure measurement, manometers are simple, rugged and virtually fool proof. There is nothing to go wrong.

Dave.

Re: Dual Fuel Gingery Type Furnace

« **Reply #46 on:** July 10, 2016, 10:20:18 AM »

Did you determine why your gas was shutting down. Did you connect to the pilot startup line or your main supply line. Sounds to me like your pilot flame was not lighting off, after a set time on your fireye (or other make) flame sensor the startup would be shut down. A properly designed system has more than one check valve in addition to your control valves and unless you loose press. on your supply side (line break) you would not be sucking air into the system. At startup you supply gas to your pilot. After a predetermined time if the fireye does not detect a flame the system shuts down. The valves suddenly closing and the momentum of the remaining gas in the pilot supply line could momentarily produce a negative press. But you would not be in danger of sucking air into the lines.

Cheers

CB

Re: Dual Fuel Gingery Type Furnace

« **Reply #47 on:** July 10, 2016, 01:40:38 PM »

The problem was handed over to the boiler supplier.

I had nothing else to do with it, but gathered from later conversations that it was due to the bore of the pipes supplying the gas. It seems they were not really big enough and when the run stage blowers came on the supply briefly dropped below a critical level. A section of bigger bore pipe was fitted leading up to the boiler and the problem went away.

Dave.

Re: Dual Fuel Gingery Type Furnace

« **Reply #48 on:** July 10, 2016, 07:52:11 PM »

Didn't do a heck of a lot of anything today, too hot and sunny not to enjoy it. Did take an hour out to hang the oil tank. Decided to hang the tank over gravel instead of the high point over the patio in case I spring a leak. Still 9' of head which should be plenty at the burner.

Cheers All

CB





Re: Dual Fuel Gingery Type Furnace

« **Reply #49 on:** July 11, 2016, 06:41:02 AM »

It certainly looks the part.

Edit out the suspension rope it it would make a passable ufo.

Good to see you are making steady progress.

Over here the weather is dull and overcast. Hard to imagine it is well into summer.

Ah well, back into the shed and light the stove.

Dave.

Re: Dual Fuel Gingery Type Furnace

« **Reply #50 on:** July 11, 2016, 08:48:30 AM »

Ha Ha UFO yes. Thanks Dave. Drop the temp. 40* and it sounds like my winters. The dog days of summer are here thier forecasting a week 30+ * hot and humid.

Guess I'll spend the day getting some color riding the lawn tractor all day. 🤪

Cheers

CB

Re: Dual Fuel Gingery Type Furnace

« **Reply #51 on:** July 13, 2016, 01:55:27 AM »

Hello all;

Got a couple of things done today. For safety I changed the direction the hoses connect to the burner, directing them away from the furnace I also shortend the burner blower barrel by 1". Made a base to bolt the fan to, it is held down by 2 large 1/2" wingnuts and is adjustable in or out 2" or easily removed altogether.

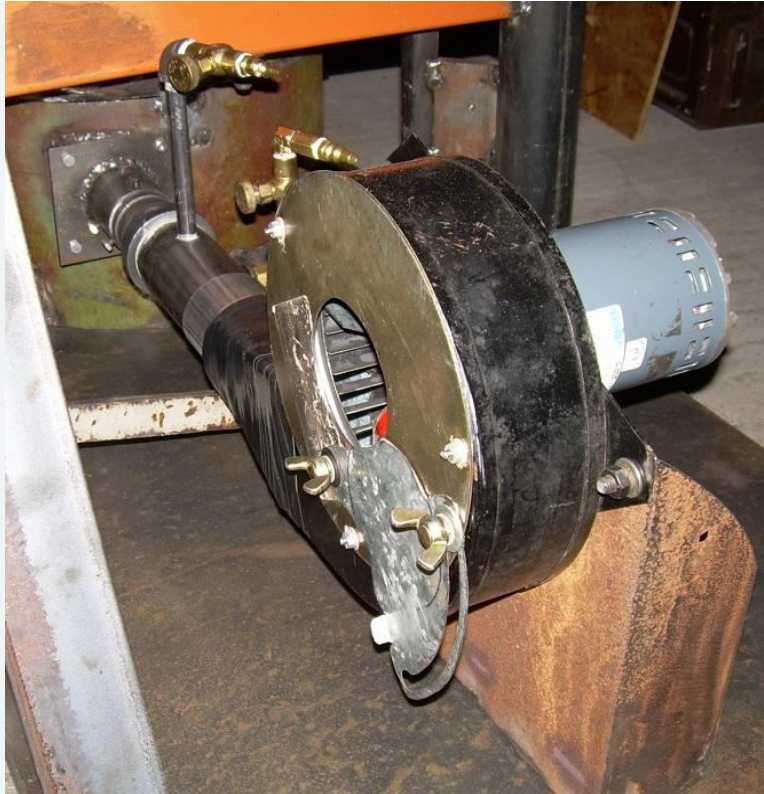
It looks putzy but I taped up transition piece to seal joints. One of first castings should be a proper transition piece.

Cheers

CB







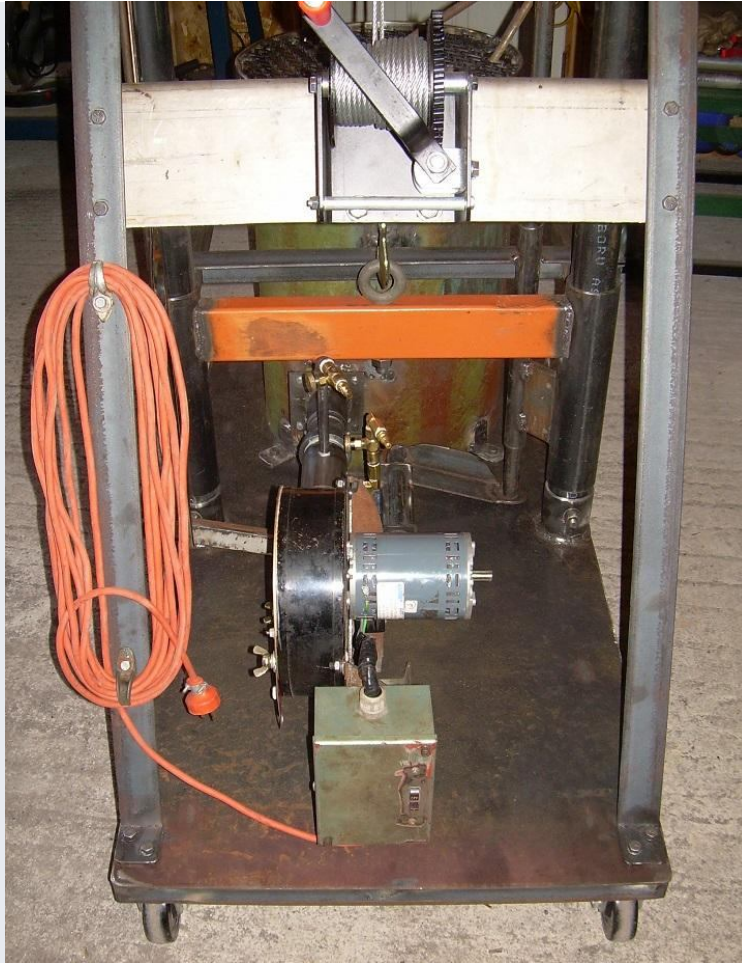
Re: Dual Fuel Gingery Type Furnace

« Reply #52 on: July 13, 2016, 04:18:44 PM »

Thats it I'm done for today hit 40°C with the humidity out there today. Couple pictures, completed the fan wiring. And moving on did a dry lay-up of the propane fuel trane. Still need to get 2-6" brass nipples and 2 brass elbows to replace the iron you see in the picture. The 2 black quik connects, connect to the 2-30# tanks and the yellow capped POL connects to the 100# tank. The yellow 3 way valve selects either the 100# tank OR the 2 30# tanks. The pressure reducers are rated 0-30 psi and 0-60 psi. The reason for 2 reducers, the dual fuel oil burner will never require more than 15# but the atmospheric burner I plan to build will require as much as 30# or more. Either or both can be used if press allows, no problem on a day like today.

Cheers

CB



Re: Dual Fuel Gingery Type Furnace

« **Reply #53 on:** July 15, 2016, 08:53:11 PM »

Cooled down enough to break out the welder today. Cut and welded up a stand for the propane piping and painted it up. Should be dry enough to install and complete the piping tomorrow. Aquired and installed a barrel pump on my WMO barrel. Hopefully this is the only barrel I will ever need.

Cheers

CB





Re: Dual Fuel Gingery Type Furnace

« Reply #54 on: July 16, 2016, 05:36:37 PM »

Installed propane piping stand and piped up the fuel trane. Nobody is stocking 6" brass nipples, went with galvanized, could not find a conflict in propane code book. Sprayed all joints down with soap and water and turned on the propane, one small leak at 3 way valve, 1/2 turn on fitting and all is good. Set low press. regulator to 10 psi and high press. regulator to 25 psi for now. Ready for service, will modify a barbecue cover to keep the weather off when not in use. Fittings for my atmospheric burner should arrive Tuesday, refractory and paint and were ready to put a fire in it.

Cheers Modders

CB





Re: Dual Fuel Gingery Type Furnace

« Reply #55 on: July 17, 2016, 05:43:52 AM »

I take it you will have a celebratory beer cooling in the fridge ready for the occasion ?

Dave. 🍺

Re: Dual Fuel Gingery Type Furnace

« Reply #56 on: July 17, 2016, 02:04:35 PM »

Ay matee, I got a birthday coming up too, so I think a bottle of the old captains private stock is in order.

Cheers Dave

CB

Re: Dual Fuel Gingery Type Furnace

« Reply #57 on: July 17, 2016, 05:00:25 PM »

Almost forgot I still had another crucible failure catch tray to make and install. I used the dome out of what was left of the water tank I used for the furnace shell. Sliced of 2 sides

and welded on angle iron sides/slides. Welded 2 more slides under deck. The dome is 3 1/2" deep at center, 1 1/2"s of sand built up on sides will easily contain the contents of a A8 crucible. Now its ready for refractory and paint, till I remember something

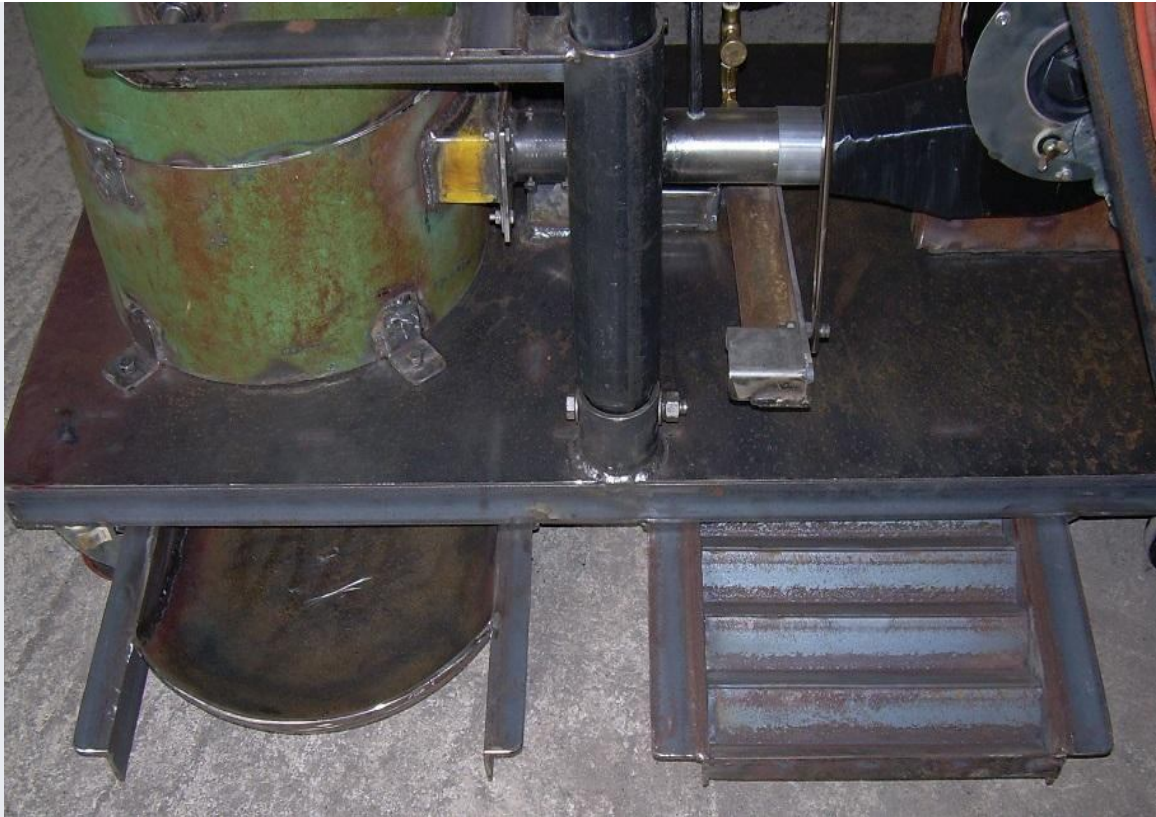


else.

Cheers

CB





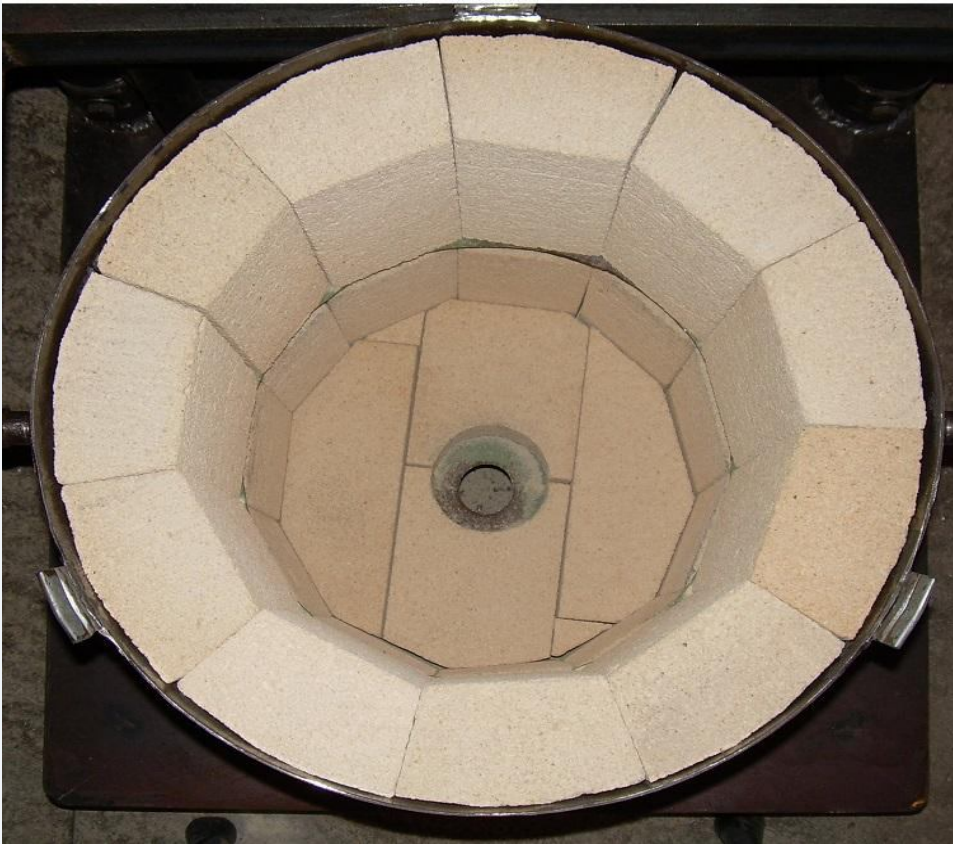
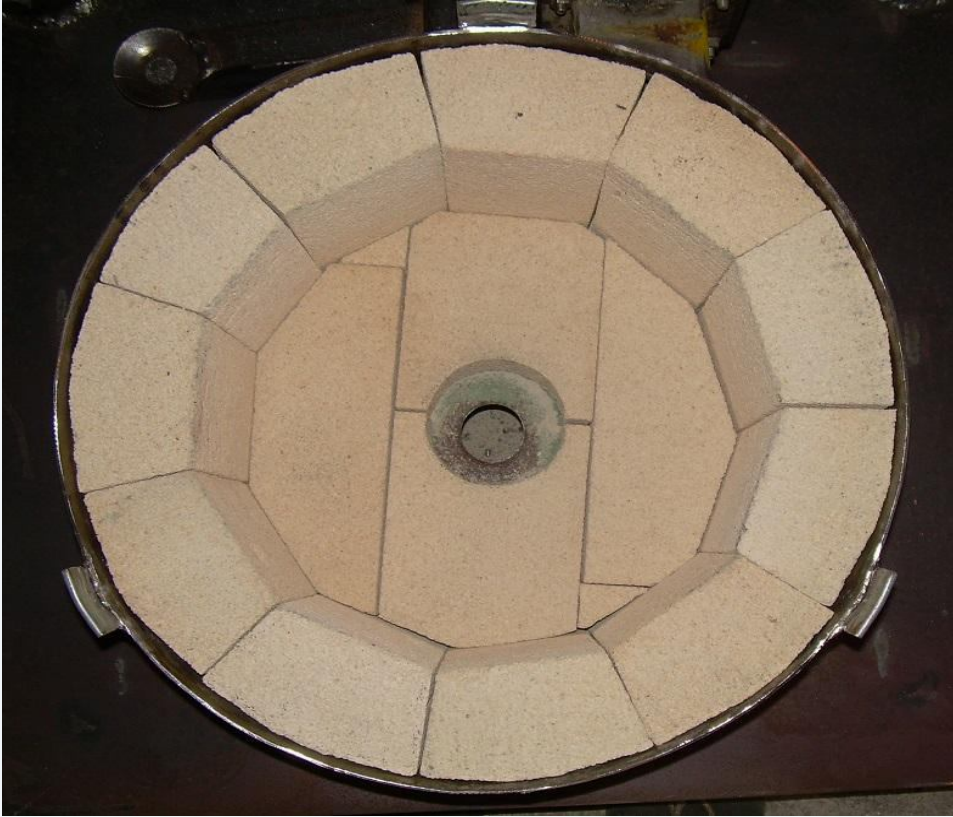
Re: Dual Fuel Gingery Type Furnace

« Reply #58 on: July 18, 2016, 10:02:15 PM »

Spent the afternoon cutting/shaping insulating firebrick. Did a dry lay-up of all the firebrick I will be using . Its not perfect but its a forgiving process everything will be thinly buttered with mortar and all interior surfaces covered with a 1" Uni-Cast 70 hotface including the bottom drain hole.The floor will get a 1 1/2" hotface.The burner port is not yet cut in the pictures.I ended up using less than half of the brick I had, so a few projects left thier yet. I also got more than half a 5 gallon pail of fines and offcuts which when easily crushed into granular and mixed with fireclay will make a good high temp insulating castable for the lid.The tops of the bricks will be finished off with 1/2" mortar for a smooth finish.

Cheers All

CB



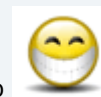


Re: Dual Fuel Gingery Type Furnace

« Reply #59 on: July 19, 2016, 01:58:46 AM »



Nicely done,CB 🍷



I like your quote: "If time is money,I need a loan".....yeah,me tooOZ.

Re: Dual Fuel Gingery Type Furnace

« Reply #60 on: July 19, 2016, 08:46:29 AM »

Thanks OZ

When I was young I couldn't wait till tomorrow. Nowadays I'd like to redo yesterday and squeeze in a little more. To many projects to little time. 🙄

Cheers

CB

Re: Dual Fuel Gingery Type Furnace

« Reply #61 on: July 19, 2016, 03:57:11 PM »

Well fittings for atmospheric burner didn't arrive today as promised so decided to cast up lid.

The pictures

1. Welded rack bolts to lid and welded ready rod to bolt heads. Rapped rods with wire to support refractory and installed fender washers on ends for extra support.
 2. Turned down piece of firewood with slight taper for vent hole.
 3. The insulating mix 1 part fireclay 2 parts crushed insulating firebrick.
 4. Wrapped vent plug with saran wrap (hopefully it will release). Filled lid with mix tapered down around vent and left 1" for the hotface.
 5. Mixed and poured the hotface and made up 2 plith blocks with my leftover.
- Covered all with plastic to allow curing overnight. Will give it a light spray before turning in tonight.

Cheers Modders

CB







Re: Dual Fuel Gingery Type Furnace

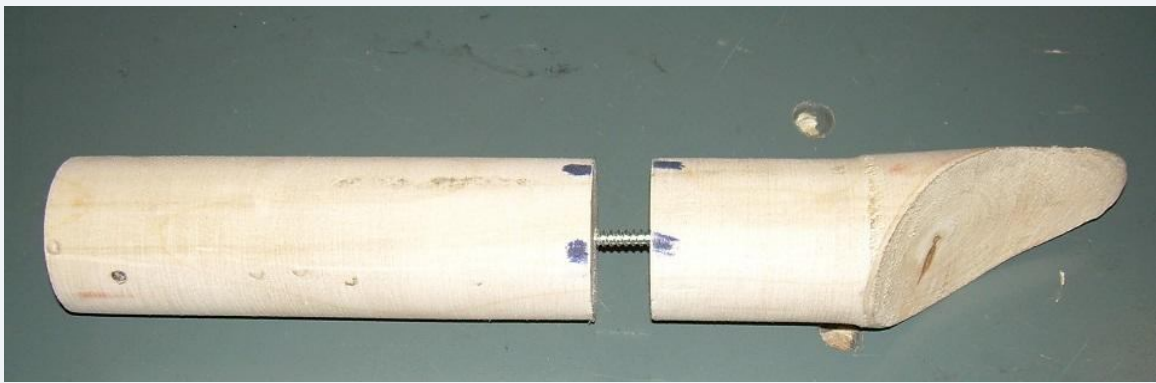
« **Reply #62 on:** July 20, 2016, 01:17:18 PM »

Cut the burner port in the brick lining this morning. Turned up a pattern for casting the burner tube. It is made in 2 parts because the pattern cannot be removed in either direction as 1 piece. A centered screw allows the 2 pieces to be separated. The pattern has a 15° flare where the flaring flame would impinge on the refractory.

Well my fittings just arrived so I may get that burner done today.

Cheers

CB










Re: Dual Fuel Gingery Type Furnace

« Reply #64 on: July 21, 2016, 04:13:43 AM »

Very smart,CB  . What is there not to like about 'this sort of stuff'.....OZ

Re: Dual Fuel Gingery Type Furnace

« Reply #65 on: July 21, 2016, 11:02:41 AM »

Thanks OZ, she may look good but is she hot, if I can build a flare mabye I'll try it out on the vise tonight. Nothing at all I could play with and read about this stuff 24/7. Not everyone is of this opinion though.  

Cheers

CB

Re: Dual Fuel Gingery Type Furnace

« Reply #66 on: July 21, 2016, 11:47:50 PM »

She's more than hot , She's hellfire. Cobbled together a flare out of a couple of old fittings, wasn't shure it would work, flares are not needed installed in furnace but for bench testing they are neccesary. Moved my portable vise outside and set up for tonight.

Flame pictures

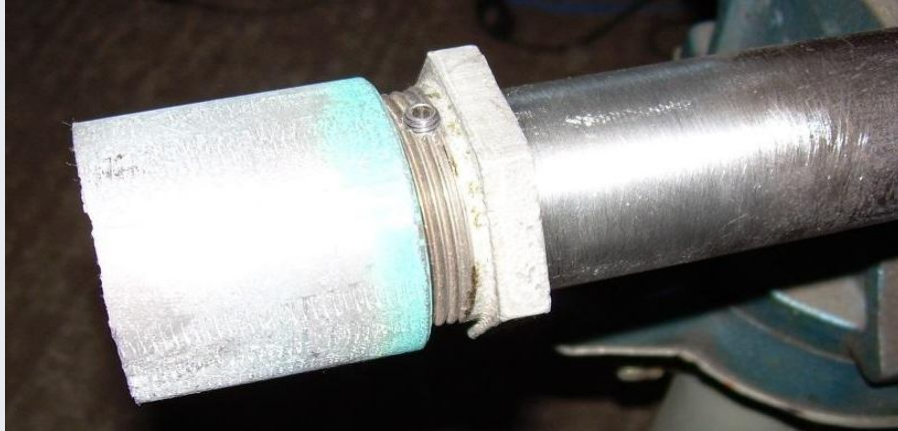
1. Shortly after start up-carburizing flame
2. cranking it up-oxidizing flame
3. Nuetral flame to slightly carburizing-the flame we want for melting
4. Flare turned cherry red in less than 2 minutes after start-up. Here the leading edge is starting to turn yellow. For fear of melting it off I did not go any higher on my settings. Both the needle valve and the choke were less than half open.
- 5 and 6 are 2 more veiws of the flame.

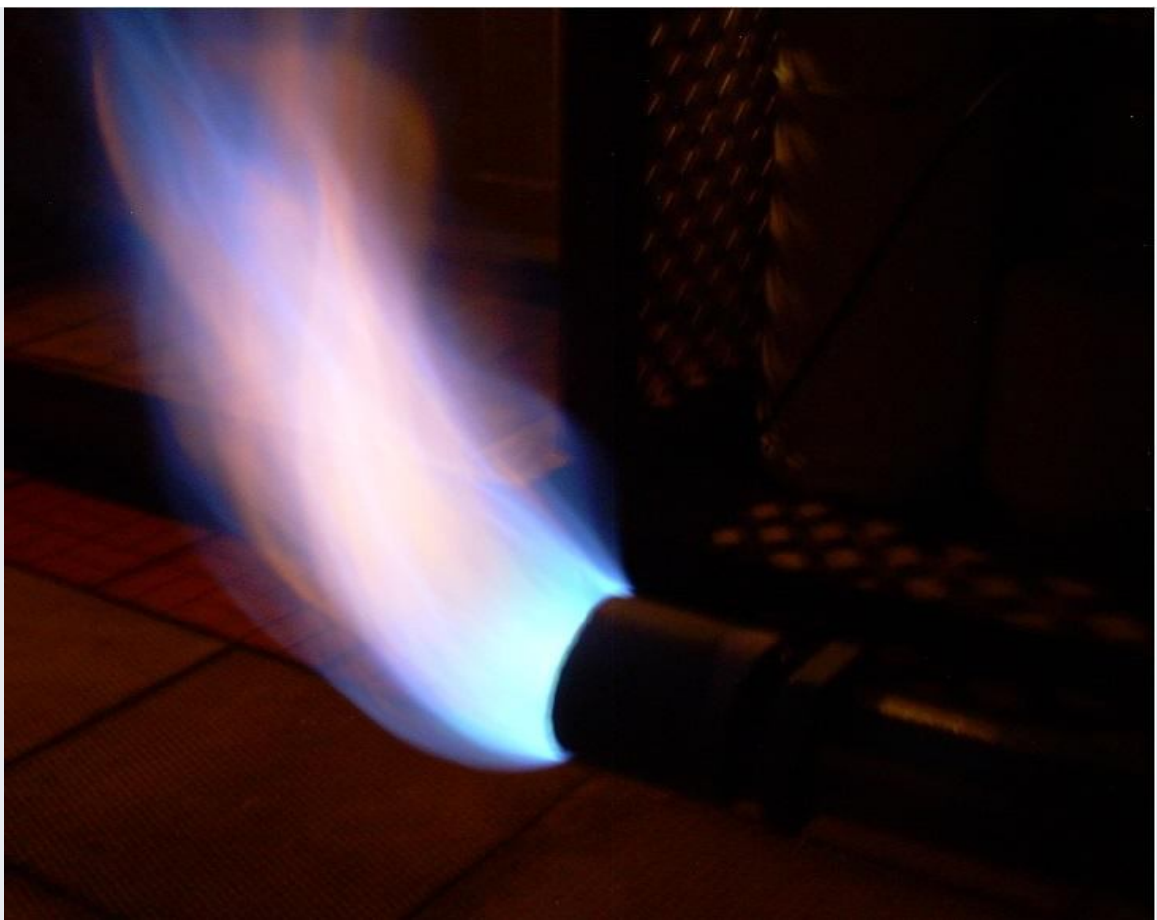
Hot baby hot.



Cheers Modders

CB











Re: Dual Fuel Gingery Type Furnace

« **Reply #67 on:** July 22, 2016, 01:38:08 PM »

Nice flame!

Re: Dual Fuel Gingery Type Furnace

« **Reply #68 on:** July 22, 2016, 05:28:09 PM »

Hi Tom. I was surprised given how rough the flare was. I cut a 15* taper in the fitting but given the thickness of the fitting it only extends 3/4" into the mouth of the flare, it then flattens out till it makes the jump to the smaller burner pipe size. A proper flare would be a little longer with a full 15* taper. The burner was a little unstable at the bottom end (normal for this type of burner) but settled down as soon as I started increasing the firing rate and remained very stable as far as I took it with a nice steady even roar.

Cheers

CB

Re: Dual Fuel Gingery Type Furnace

« **Reply #69 on:** July 24, 2016, 06:29:37 PM »

Completed the patterns to finish the refractory pour. Did the big pour yesterday, the bricks have to be soaked in water before installation so they don't dry out the hotface to quickly and the uni-cast 70 has a short work time. This made for a pretty intense process and I forgot to take pictures. Left overnight to cure. Removed form and patterns this morning still a little soft so some of the corners chipped. To wait till it hardened up much more would make it very hard to remove form and patterns and possibly cause even more damage. Vesuveius mortar is great to repair these touchups. The darker shiny spots is where I have just applied it.

I will let this all dry for another 3 days then I will periodically fire it for a couple of days till I reach red heat.

Cheers

CB





Re: Dual Fuel Gingery Type Furnace

« **Reply #70 on:** July 25, 2016, 04:00:43 PM »



Nice looking casting well done!

Re: Dual Fuel Gingery Type Furnace

« **Reply #71 on:** July 25, 2016, 06:15:35 PM »

Thanks for the support Tom. It was a workout for this old body to coordinate, the floor is a little rough it was out of reach under the bottom pattern on the form when I vibrated the works. The plith sits true so its not a big deal. I had intended to apply a high temp. gasket between the bottom two sections, I was convinced it was not needed. If I find this a problem I can still add one on the underside of the middle section.

I guess its ready for a good clean-up and paint job before I light a fire in it.



Cheers Tom

CB

Re: Dual Fuel Gingery Type Furnace

« **Reply #72 on:** July 27, 2016, 11:51:33 AM »

Did the furnace clean-up yesterday, came across a problem in the lift assembly. The unsupported end of the top pulley was deflecting with the added weight of the refractory, occasionally dragging the cable instead of turning. Not good. I suspected it was to easy a solution when I pulled it out of the junk box but hindsight is 20/20 as they say. So back to the junk box we go. This is what I came up with. Installed this morning and tried it out. Works great no hang-ups.

Cheers CB





Re: Dual Fuel Gingery Type Furnace

« **Reply #73 on:** July 28, 2016, 12:44:21 PM »

Started firing the furnace to dry out the lining this morning. Tried out the dual burner on gas for the first time. Lights easy and runs good at low end, did not crank it up as the lining started to steam shortly after lighting. The fan inlet damper is barely open in the badly focused flame picture. Shut the burner down when the steaming started to peek. I checked the internal wall temp after shutdown 329°F. I will let cool and fire it a couple more times today going a little higher on the temp. each time.

Cheers

CB





Re: Dual Fuel Gingery Type Furnace

« **Reply #75 on:** July 28, 2016, 04:51:59 PM »

I agree Tom fiberwool is nice to work with. Did some work with it at the Kidd Creek zinc smelter. We used to use it to plug refractory cracks in the heat recovery boilers. I plan to use it in a forge I would like to build (too many projects too little time). The brick was free so it reduced my costs considerably and it is of high quality.

Don't know if I mentioned it before but 30 some odd years ago I built Gingery's Lil-Bertha and did some casting. In the first pic. from left is a sander table I cast some obvious beginner problems but it held up longer than the sander. An unused steel crucible still kicking around, some moulding stuff, a set of screw drivers I cast, not recommended for electrical work but indestructible in the shop, plan on casting some more. The black handled screwdriver is like the one I used for a pattern. And on the end a mold rammer still kicking around.

The next 2 pic.'s are a couple conveniences I added to the frame today a peg to hang my burner wrenches and lighting wand and hooks to store propane and oil hose.

The next 3 pic.'s are the second heat today. Got to less than 1/4 on the fan damper before the crucible reached orange heat. Backed off and held for another 5 minutes before shutting down. I don't think having enough air to burn oil is going to be a



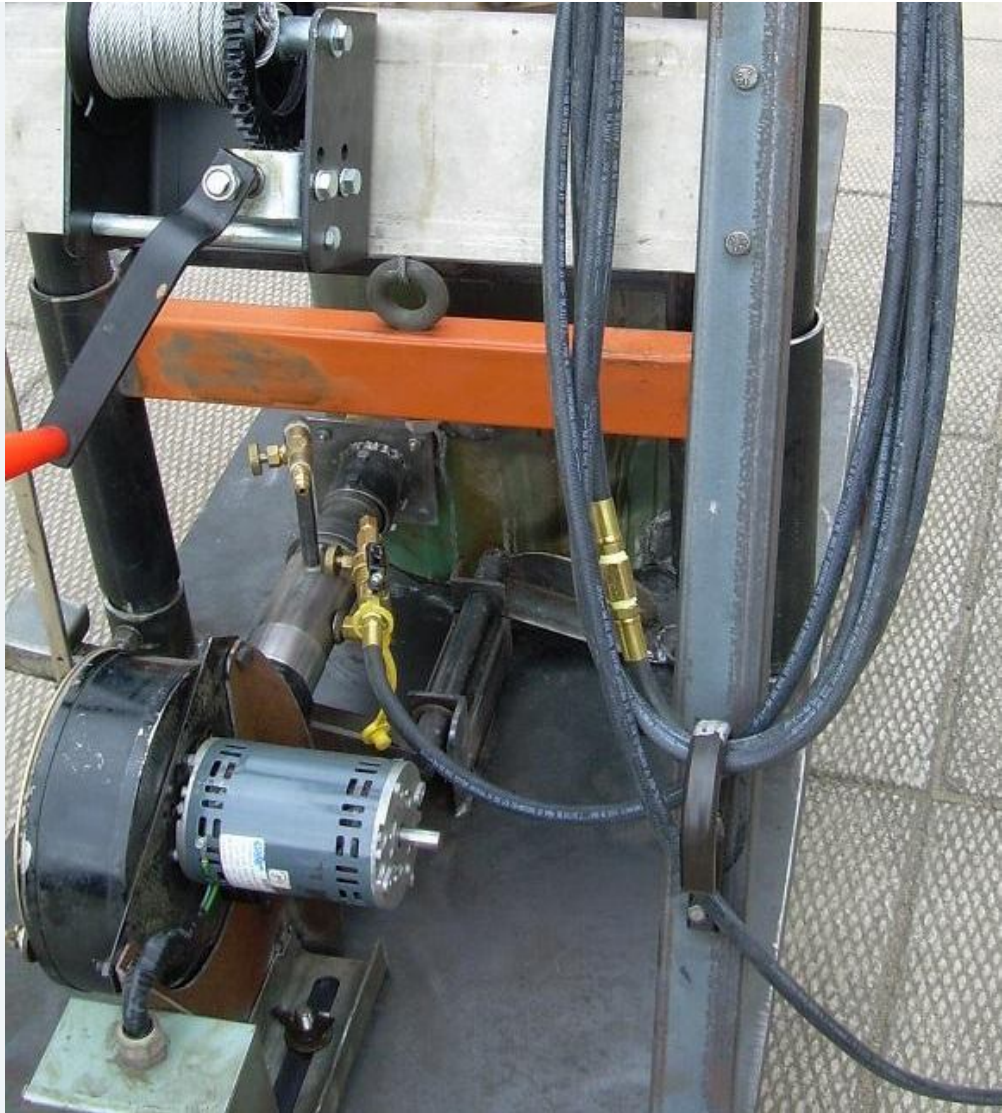
problem.

Sorry about that last pic. trying to focus on the crucible.

Cheers

CB









Re: Dual Fuel Gingery Type Furnace

« Reply #76 on: July 29, 2016, 10:21:00 PM »

Expected a slow day watching fire in the furnace, not going to happen. Decided to try the atmospheric burner in the morning heat. It lit but insisted on burning well down the pipe. No adjustments I made would get it out of the pipe. Tried it on the vise, good there. Removed Asian welded burner pipe and filed down the weld ridge down the middle of the pipe, tried in furnace, no go 🚫. Because of furnace back pressure the venturi effect of the reducer was not generating enough velocity to overcome the flame advance. My jet was 3/4" from pipe inlet, Rupert Wenig's was 5/8" but some of R. Reil's were as much as the full length of the reducer 1 3/4" 🤔. I removed the T and jet and went with a straight pipe with a #53 jet drilled in it. After some fiddling to center it down the burner pipe, distance to burner pipe now 1 1/4". Lit on first try and did not retreat into the pipe as I



ramped it up.

Installed 2 grease fittings on the main lift slides.

The rest of the pictures are my evening heat with the atmospheric burner. Moisture is all gone, developed a few small cracks. If or as they get worse an occasional application of vesuvius should keep it in repair. Included the second last pic. just for the rich color.

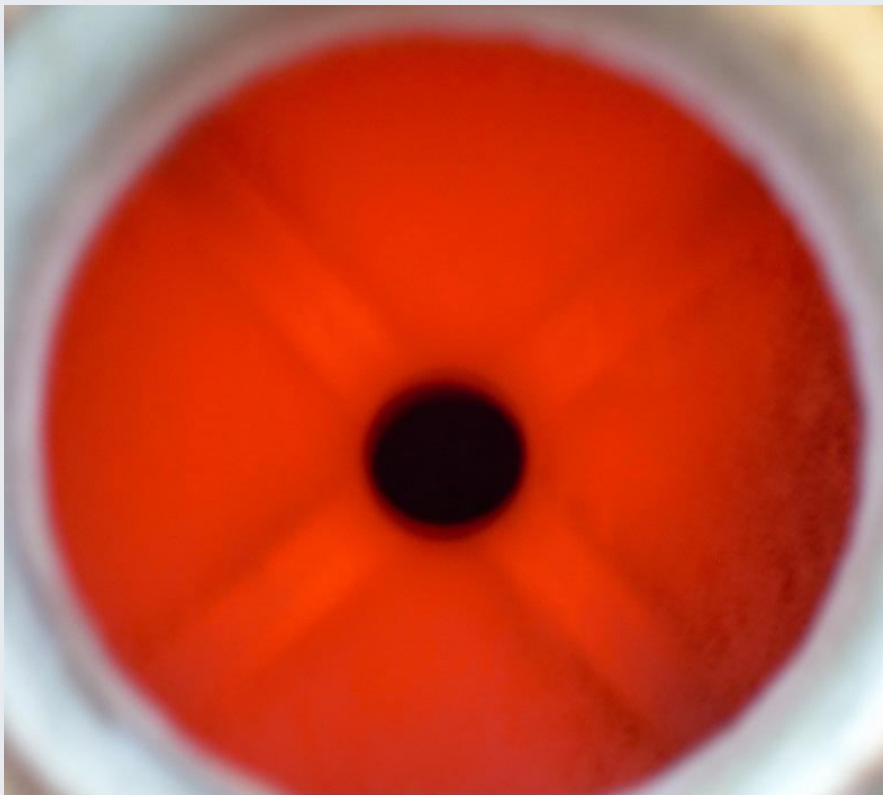
This was just before I shut it down.

Cheers

CB









Re: Dual Fuel Gingery Type Furnace

« **Reply #77 on:** July 30, 2016, 04:27:43 AM »

CB - I can't contribute anything but if there's a new instalment when I log in it its the first thread I open to read the next thrilling instalment. Thanks for taking us

along 🍺🍺🍺

Dave (IOM)

Re: Dual Fuel Gingery Type Furnace

« **Reply #78 on:** July 30, 2016, 08:51:21 AM »

I'd just like to point out that you will almost inevitably have cracking, it's the nature of the beast, a rigid material heated unevenly is probably going to crack, hopefully fine hairline cracks! i wouldn't worry about it!

Regards, Matthew.

Re: Dual Fuel Gingery Type Furnace

« **Reply #79 on:** July 30, 2016, 09:37:47 AM »

Thanks for the kind words Dave. I'm doing what I enjoy and get to share it with like

minded people. Can it get any better?



cheers



Yes Matthew have to look close to find few hairlines in hotface. More obvious in fireclay mix in lid. The support installed in the lid should hold things together and the occasional mortar application will hopefully prevent any crumbling.

Cheers

CB

Re: Dual Fuel Gingery Type Furnace

« **Reply #80 on:** July 30, 2016, 08:28:44 PM »

Decided to try oil before the paint goes on. Filled oil tank and hung with hose and heater installed, temp. increased from 82* to 104* in about 1 1/2 hrs. Second picture is the burner set-up. Fired up on gas to preheat, when the plith started to glow I cracked open the oil and gave it more air. Over the course of 20 minutes slowly increased oil, reduced gas and increased air. In the third picture the oil is wide open the gas is disconnected and the fan damper is wide open.

The next 3 pictures are with the burner on just oil. Hard to get good pic's the heat exiting the top is tremendous. You can see the oil spray hitting along the wall vapourizing and burning. Burned clean except for a little smoke between the bottom 2 sections. The gasket I talked about earlier and an adjustment of the gun in the burner port should cure this. The last picture is the furnace packed up and ready to move indoors for the night.

Quite happy with the results, with a little more use I should be able to fine tune air-oil ratios and bring it up on oil quicker.

Well thats pretty well it. A couple of coats of paint tomorrow or Monday then build some mold boxes and mix up some molding sand, I can then run some tests on how well it melts metal.

Cheers All



CB



