Coal Gasifier Stove

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Components and Construction

Fig. 1 Combustion Unit. Fig. 1

A Combustion Tube. 150mm diameter, with max length of 500mm. Formed by rolling with folded or lapped joint. Drill all holes before forming. Minimum thickness 1 mm. Thicker will give longer life. Top edge is bent over 5mm to form a support flange. 2 rows of 25 x 10 mm holes are made just below the top flange. 2 Rows of 12 x 8mm holes are made just below the Tube B . And rows of 12 x4 mm holes are made every 40mm down the tube. With the holes staggered horizontally to give a diamond shape between the holes.

B, Air Heating Tube.   200mm diameter. 150mm high. Do not forget the 2 x 8mm holes Z at opposite sides, just above the air register. Allow extra height for folding over component C and D. Thickness 0.5 mm.

C. Support Ring. An annulus with ID of 150 and OD of 240 mm. Minimum thickness 1 mm.

D. The Air Register: 2 annulus rings, with 16 x 13mm holes evenly spaced. The lower ring is fixed to component B by the fold and a tight slide fit over A.. The top ring is a loose fit against A and B with flat adjusting arm welded onto the outside perimeter. The holes must correspond with the lower ring, and a cutout is made in B to allow rotation of the ring to allow hole openings from fully closed to fully open. Suggested thickness 3mm. ……….…An alternative to the air register annulus rings is to drill the air holes around the perimeter of B, just above the bottom. A spring loaded belt of 0.5mm thickness is fitted around the tube B, over the air holes, with corresponding holes. The air flow is then controlled by rotating the belt. Fit suitable handles to allow this movement, as the surface is hot. The annulus rings D, are then replaced by a single ring of 0.5mm thickness. The 2 holes Z will then be placed just above the belt.

E. Cone Shaped Burner: 2 burner pieces are obtained from an annulus ring.(each is 180 deg of the circle) The outer perimeter is 2 times the perimeter of the combustion tube A, plus 20 mm for two overlap tabs of 10mm each. (divide by 3.142 to obtain the outer radius. The inner radius is 68mm, which allows a 10mm fold over tabs after inserting the cone into ring F. The overlap is set to give the bottom of the cone a tight slide fit into Combustion tube A . The cone is rolled and the lap joint is fixed with iron rivets or brazed, or spot welded.. The holes are set 1 third and two thirds of the height of the cone, with the upper holes 6mm, and the lower 8 mm. The upper and lower holes are staggered as per the drawing. Thickness is 0.5 to 1mm. The top of the cone fits into the support ring F and vertical cuts are made to produce fold over tabs.

F. Burner support ring. An annulus ring of 75 mm ID and 200mm OD. Thickness is 0.5 mm. It is fixed to Support ring C with 4 aluminum pop rivets H to prevent it from being dislodged when handling the combustion unit. An indent at each rivet is normal, with the top of the rivet below the surface of F.

G. Air Register handle. A flat bar 3 mm thick, 15 mm wide and 150mm long. But welded onto the upper ring D.

K   GRATE UNIT : A loose fitting tube 70mm height with a 6 mm stainless screen. The fine screen will allow air to enter but prevent the ash from falling out, which is desired. Holes are drilled close to the bottom on opposite

sides, aligned to the holes in Tube A, to allow the grate to be set at different heights, with a pin made from stiff wire or a 2.5 mm welding rod
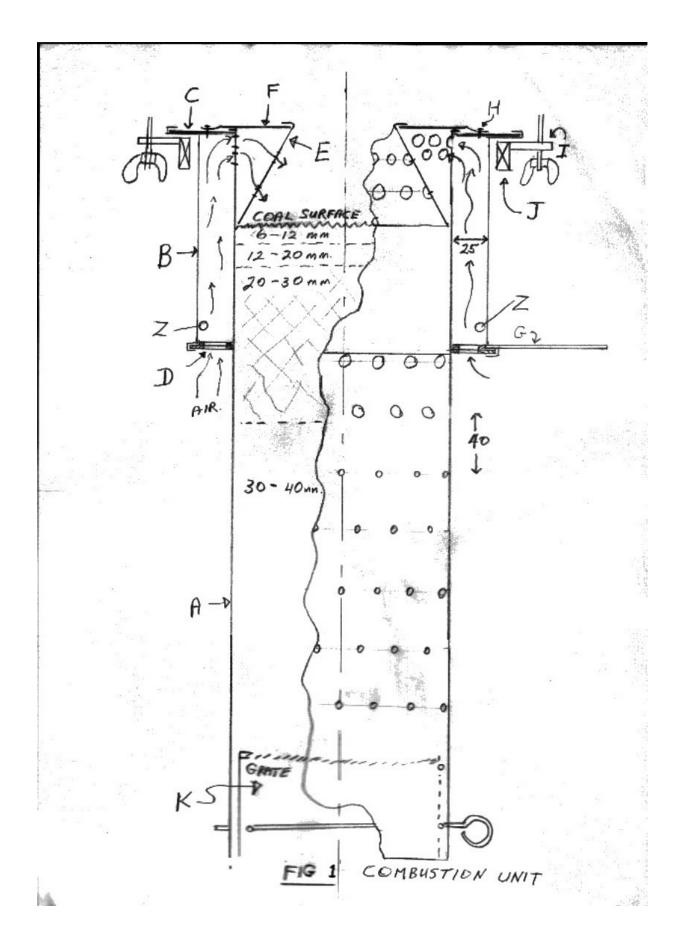
Cooking unit Fig 2 & 3.

L & M   2 annulus rings OD 300mm ID of M is 75 mm and L is 150??? Mm. Fold over tabs are cut 5 mm   . deep around the outer perimeters. Thickness 1mm.

N. A flat sheet of 110mm wide and length sufficient to give a diameter of 280 mm plus extra 25 mm for the folded joint of 8 mm. A 5 mm lip is folded along both sides of the length before rolling and joining the ends with a folded joint. Thickness 1 mm.

O. .Symbol not used.

P. Internal baffle and pot support. This strip t fit snugly between L & M is placed after all other construction. Thickness 1 mm.

Q. Chimney stub. A tapered tube to fit into the bottom of the chimney R. A lapped joint with iron rivets is suggested. The joint to M is made by cutting the end to match the curve of N with the required angle to match the chimney piece. The hole in N is marked, and cuts are made at the end to form an even number of of 10 mm square folding tabs. Every 2nd tab is folded outward to form a flange , with the other tabs sliding into the hole. These tabs are then folded outward inside the tube N.
.   A 4 mm peephole S is drilled at the opposite upper side of N, which is used to view the flame.

R. The Chimney: A commercially produced round section gutter down pipe of approx 75mm diameter with a length of 2.7m. (may be galvanized)

S   The 4mm peephole.

T   A few 10mm holes are made 25mm from the top of P to allow some hot gasses to bypass the internal baffle direct to the chimney to allow even heat under the pot.
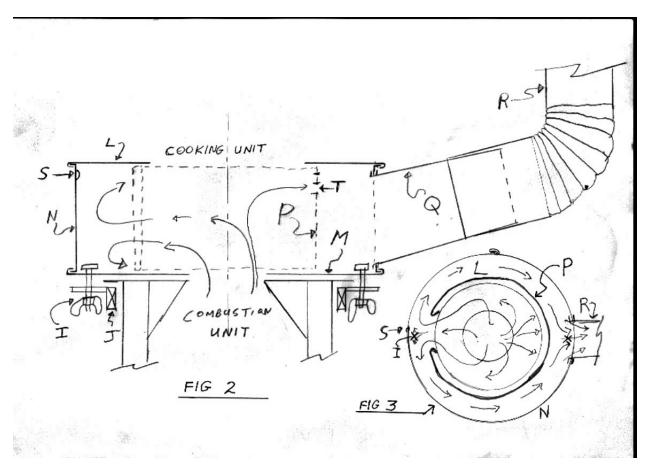
NB. Do not use galvanized sheet (zinc covered). It may burn and cause toxic zinc oxide fumes in the air.

SUPPORTING THE UNITS (REFER TO fig 2)

A U shaped support bracket J is made which fits under the support ring C, but allows the combustion unit to be withdrawn for fuel charging and cleaning. Two tabs are fitted to take the clamping bolts with butterfly nuts I . The weight of the cooking unit and pot will help to close the gap between the two units,
but are hand tightened to ensure a seal.

The support bracket is fixed to a reflector stand as in the photo, or supported by 3 legs, tripod fashion.

C F H

E

COAL SURFACE

6-12 mm

B 12-20 mm

20-30 mm

25

Z Z

Z G

D

AIR 40

30-40mm

A

GRATE

K

FIG 1 COMBUSTION UNIT

J

I

FIG 2

FIG 3

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