Building a clay oven

You are going to need to fashion three things: some sort of a raised plinth, which is both a support and a floor for your oven; the oven itself; and a simple roof, to keep the rain off.

You can make your oven pretty much any size that suits you, so you should think a little about what you want from it. Will you be baking a dozen loaves at a time, or only two or three? Would you want to be able to fit a whole shoulder of pork in, or will you never cook anything larger than a leg of lamb? You should take into account that the oven is hottest around the edges (the heat radiates from the walls and floor), so there is more chance of scorching food in a small, cramped oven. On the other hand, a large oven will take more fuel to heat, so I wouldn't make it any larger than you think you will need. To make things simpler, I will assume a square plinth 150cmx150cm, and will give oven dimensions accordingly; this will give an internal oven space 80cm in diameter, and about 40cm high, which is a good size for a few loaves, or a large roasting tin, or three or four pizzas at once. In practice, it is perfectly simple for you to scale this up or down; the entire oven size is dictated by a single measurement – the diameter of a hemisphere of sand, which you will build, and around which your oven will be moulded.

The plinth

Technically, you could build an oven at ground level, but in practice this would be too inconvenient; you would just have to bend down too far to see in it. Ideally, you want to raise the floor of the oven to somewhere between half and one and a half metres. The nearer to eye level you get, the easier it will be on your back – but an eye-level oven would mean an awful lot of plinth, which you may find a little obtrusive. You should also take into account that you will be scraping hot embers out of the oven. They need to drop into something, and the further they have to fall, the more chance they will miss. There are any number of ways to build your plinth, and I am sure you will want to think aesthetically as well as structurally; if you are going to build it, it may as well look good – and you probably want it to fit in with your garden. The structure must be solid, and stable, as must be the ground you build it on. You should allow yourself a good metre and a half clear space in front of where your oven door will be: this area becomes your 'kitchen', and you need room to move. The top of the plinth should be made of brick, or stone, or concrete. Remember that this will become the floor of the oven, so make it as flat as you can.

Our plinth at RC is 120cm square, 70cm high. The walls are railway sleepers, set on solid level ground and fixed with right-angled brackets on the internal corners. This is infilled with rubble, the top of which is levelled with sand, to

about 2” below the top of the sleepers. Plain London bricks are set on this, upside down (flat side up), in a herringbone pattern, to form a level top. The gaps between the bricks are filled with more sand.

The roof

The roof can be anything you want it to be – it just needs to keep the worst of the rain off. A little water isn’t going to hurt, but badly weather-beaten clay will start to erode, and a soaking wet oven will just not get hot enough. Bear in mind too that a lot of smoke will be coming out of the oven, and your roof is bound to affect the air flow around it; you may wish to make provision for a chimney if you feel the space is too enclosed – say, if you are building up against a wall. If you don’t want to build a roof, you could just keep your oven covered with tarpaulin when you are not using it.

The oven

There will be three layers to your clay oven, and you need three separate days to build them, as each layer has to dry fully before you start the next one. Drying time depends largely on the weather, but you can – and should - accelerate the process by lighting fires inside it. The oven consists of an inner skin, made of a mix of sand, clay and water; an insulating layer, made of clay, wood shavings and water; and an outer skin, made again of sand, clay and water, with a brick-arch doorway, if you so wish.

Preparation

Ahead: get 8 buckets of clay, 18 buckets of sand, half a black sack’s worth of wood shavings, a large heavy-duty tarpaulin, a newspaper, and a thin stick – which will be your measuring stick - with a marker (pen, or tape, or a cut) 7cm from one end. If you want to build a door and a chimney lid, you will need perhaps half a square metre of wood (hardwood is best), a good couple of centimetres thick, and a decent saw.

Sourcing your materials

Clay

To get clay, you need to go digging. Dig pretty much anywhere and you will find it, though away from a source of water it is likely to be pretty dry. If you have access to a pond, or a stream or small river, you will be able to do the same – with permission from the landowner, of course. Your clay should be squidgy, and reasonably free of other soils and stones; work a small piece with your hands until it is supple, then roll into a snake and wrap it around your finger. It should not snap. You may prefer to buy your clay, of course. I am yet to find a builder’s merchant that sells it (but I feel there must be one somewhere); however, a friendly local potter will surely be able to point you in the right direction.

Sand

Sand is a natural material too, of course, and if you can get it for free – great; otherwise, builder's merchants sell sand pretty cheaply. Any grade is fine.

Bricks

A builder's merchant again – or a reclaim yard. Buy whatever takes your fancy.

Wood shavings

Any timber merchant or sawmill should sell you wood shavings; these should not be too coarse, or too fine – something like muesli would be good.

Workday 1

To do list:

Mix clay and sand

Build sand former

Build inner skin

Remove sand former

Begin drying

Mixing clay and sand

Lay the tarpaulin out on the ground, and tip onto it 6 buckets of sand and 3 buckets of clay. This will give you enough for today's work, but if you want to get ahead of yourself, you could double the amount, which will be enough for the outer skin too. Now, stick a pair of wellies or stout boots on as many friends as you can find, and start stomping. Throw out any stones as you come across them. Every so often, get hold of both corners of one end of the tarpaulin and pull it over to meet the other end; this will turn the sand and clay over on itself, helping to mix it thoroughly. You may feel the mix is just too firm and dry, and difficult to work, in which case you will need to add some water; this is likely, if the clay was very dry to begin with. If you dug clay from a riverbank or pond, chances are it is wet enough already. The final consistency of the mix should be soft enough to easily mould and shape, and strong enough to hold its own weight. When your mix is looking pretty well blended, you should test the consistency. Take a lime-sized piece and spend a minute or so compacting it. Now hold it at shoulder height and drop it; on impact, it should crack, but roughly holds its shape. If it crumbles, the mix is too dry – add water. If it 'splats', it is too wet – add more sand.

The sand former

The first stage of building is to make a dome of sand, which will be the former around which you build the first skin of the oven. First, trace a circle 80cm diameter, centrally on the plinth. Next, heap sand into the circle and start

forming a dome – or almost a dome. The mound should rise vertically to start with, to about a hand's depth, before it starts to curve inwards; this gives much more headroom for anything cooking next to the wall. The finished dome should be about 40cm high. From time to time, stand on the plinth, centre your eyes over the dome and get a bird's eye view of your work – it is much easier to spot imperfections from up there. When you are happy, the next step is to cover the dome with a layer of wet newspaper. You will be digging the sand out later; this newspaper layer tells you when to stop digging. So; soak whole sheets and lay them over; you don't need to be neat, by any means – just make sure you completely cover the sand. This is slightly harder in practice than it sounds, but only slightly; the paper won't stick to the sand as well as you might hope – but it will stick to itself.

The inner skin

You are now ready to start building your oven. The technique is simple; pick up a good handful of cement, and pat it and mould it into a rough brick shape. Sit this adjacent to the dome, and using the edge of one hand as a mallet, and the other hand as a buffer (see picture), pack the brick down to a width of around 7 cm (use your measuring stick as a guide). Make a second brick and sit it alongside, packing down in the same way. The 'bricks' should merge into one. This packing down is essential; apart from giving the structure more solidity, it removes air pockets which can expand with the heat of the oven and cause cracks. Continue this until you get all the way round, then start your second layer, and so on. You don't need to measure every time, but poke your stick in every now and then to make sure you maintain the thickness. And don't forget your bird's eye view – this is still your best guide. Once you reach the top and close the gap, take some more time to depth-check and smooth your dome; the more even the structure, the stronger it will be. Save any leftover mix; splash a little water over, shovel it into plastic sacks or bin bags, tie the tops to stop it drying out, and keep it for later. You should leave your oven, for at least a couple of hours, (you could even leave it overnight if it suits you) to just settle on itself and firm up a bit.

Removing the sand

With a decent knife, cut an arch where you want your door to be. Decide how wide you want it; do you have a particular roasting tray that needs to fit through? 30cm wide would be a reasonable size, and perhaps 20cm high for now (you will adjust the height later). Pull the cement out from the arch that you have cut, then with one hand, start hollowing out the sand. At some point you will reach your layer of newspaper. As you expose it, peel it away. Keep digging, and peeling, until all the sand is removed.

Drying the cement

Over the next few days, you want your oven to dry out completely. Light a fire inside as often as you can; this can be tricky, as there is a lot of moisture inside, and not much oxygen. It is best to light a small fire near the doorway, where there is more air, then push it to the back once it is going strong. The first time you have a fire going inside,

observe the smoke level. Cut the doorway to enlarge it, so it is just higher than the smoke level, allowing it to escape. Your oven is fully dry when it has stopped steaming during firing; the colour will be considerably paler too.

Workday 2

To do list:

Build door arch and chimney

Make clay slip

Mix slip and woodshavings

Build insulating layer

Continue drying

Building the door arch and chimney

You can form the door arch from clay and sand, but I recommend you make it from bricks; it will look attractive, and bricks are stronger – they will withstand little knocks far better. Build a sand former the same size as your doorway, extending forward a brick's length from the base of the oven. Now build an archway around the front section of the former, using some of your reserved clay and sand as mortar between the bricks. Use more clay and sand to extend the doorway back to meet the receding wall of the oven. Cut a hole in the top of this, roughly 20cm diameter, and form a chimney around the hole, around 20 cm high. Remove the sand former after a few hours.

Making a clay slip

Drag your tarpaulin out and empty onto it a buckets of clay. Tip maybe half a bucket of water onto this and squash together with your feet. As the water gets blended in, keep adding more until you have a sludgy gloop with the consistency of thick yoghurt – this is called slip. Next, mix in some wood shavings with a shovel, until you have a crumbly mixture that just holds together when you compact it.

Building the insulating layer

Using the same method as before, pack your wood and clay mixture over the dome, again to a thickness of about 7 cm. Skirt around the doorway – you don't need to insulate the arch. Dry this layer out, building the odd fire, over the next few days.

Workday 3

To do list

Build the outer wall

Make a door and chimney lid (optional)

Building the outer wall

The method is exactly the same as for the inner wall. Take some time to get a nice smooth finish. You could decorate it too, if you like – you could use some natural paints, perhaps, or stud it with stones. The important thing is that the oven can breathe, or it will retain moisture – so don't smother it in tiles, or anything else that is not porous. Dry it out, building fires, as before.

Making a door and chimney lid

Measure and cut a piece of wood to fit snugly inside the door arch. Cut a short baton for a handle, and glue or nail it to the outside. Cut a circle from another piece of wood to sit on the chimney. These will not be fireproof, of course; they are for retaining heat after the fire has been removed. Soaking then in water before every use will help stop them warping.

Using your oven

The oven will need three or four hours' firing to get up to temperature. Start a small fire just inside the doorway, then build it up until it is burning well. When it is good and hot, use sticks or a bread peel to slide it (carefully) right to the back , then keep feeding it as you need to to maintain a good rolling flame. The heat will become ferocious. I cannot give precise timings – you will get used to your own oven – but if the outer wall feels fairly warm you can be pretty sure the inside is scorching. For the last ten minutes, spread the embers out to get extra heat into the whole floor. When you are ready to cook, scrape or shovel all the embers out. You will need something to scrape them into, of course; a metal dustbin is pretty useful, though if you can find something with a flat side which can sit flush to the wall of the plinth, you will find it much easier. At River Cottage we use a pig feeding trough, which is perfect. For most cooking, you will need to wait for the oven to cool a bit. The internal air temperature can be as high as 450c, even with the fire removed completely. The surface temperature of the floor will be even hotter. This is absolutely perfect for cooking pizza, which will be cooked and slightly (perfectly) charred in little over a minute, but nothing could stand this heat for any longer than that – a loaf of bread would be black in no time at all. An oven thermometer would be extremely useful, if you can find one that can measure that high - they aren't too expensive. But you already own a reliable temperature gauge – three, in fact; two arms, and your face. As you get to know your oven, you will get used to the searing heat, the feel of it on your skin, as you reach and peer in. I reckon if I can hold my hand just inside the doorway for perhaps a couple of seconds, I can probably bake a batch of bread without too much scorching. If I can't, I wait. A bit of trial and error is my preferred method, and when I am making bread I always make a couple of small balls of dough, for testing before the real thing.

To bake bread in your oven, follow your chosen recipe, then slip your loaves in one at a time; the first one should go to the back, so you are not reaching over it with subsequent loaves. Keep a good eye on them; you will almost certainly want to shuffle them around as they always colour unevenly, particularly those around the edges.

Once the bread is baked, I always feel it is a shame to waste the residual heat, so I almost always have something ready to follow it with – the temperature would now be perfect for a joint of meat, for example. Don't forget, also, that your oven will also make an effective, if rather immobile, patio heater.

The life of your oven

Don't expect your oven to last forever – it probably won't. There are many factors that will affect its life span – the purity of the clay, the type of clay, the amount of small air pockets in the walls, the strength of the structure, the number of times it is used, the climate…As your oven settles into life, you may find cracks appearing. This can happen very early on – during the initial drying, in fact. You should not worry unduly about this; fill them in with clay, if you wish; or just leave them. You may find eventually that the cracks become so large as to affect the efficiency of your oven, in which case you should certainly fill them in; in the end, some day, it may be time to knock it down, and build a new one.