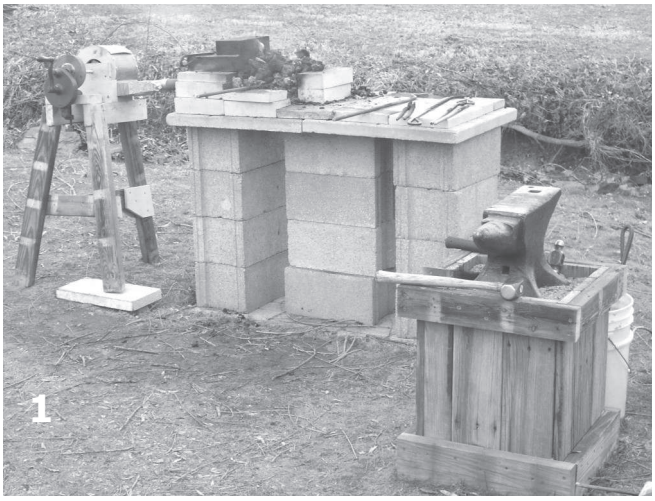
Forge Building 101! By Tom Rohosky

When I decided to build my own coal forge a couple of years ago, I wanted something that was quick, easy, and inexpensive to put together.
Up until then, the only coal forges that I had seen or worked on functioned as follows: the fuel burned in a firepot (normally made of cast iron), and the air "blast" came in through a T-shaped "tuyere" pipe underneath the forge, then up through a perforated iron or steel plate in the bottom of the firepot. This sounded pretty simple in theory, but most of the do-it-yourself designs that I found called for welding or other metal fabrication equipment, which I did not have. Then there was the problem of finding (or buying) the metal stock to build it with.
The solution to my problem was inspired by a book that I had picked up a few years ago: A Blacksmithing Primer, by Randy McDaniel. In the first chapter, Randy mentioned something that he called a "side draft" forge, which he described as the earliest and simplest form of forge, dating back to ancient times. I later learned that it is more commonly known nowadays as a "side blast" or "back blast" forge. Randy's book had a sketch of burning coal piled up against a vertical wall with a pipe sticking out into the fire. That looked about as simple as you could get.
After some thought, I came up with my own forge design that is shown in photo 1. It met my "quick, easy, and inexpensive" criteria, and it had the added advantage of letting me use up some scrap materials I had lying around from other projects.
The base and top platform each consist of 24-inch by 24-inch concrete patio stones. I used 24-inch stones simply because I had some lying around. Different sizes would work just as well, though I would suggest you not try to go much smaller. This size works okay for me, but I have found that it's easy to knock fuel off onto the ground if you're not careful.
Between the base and the top platform are 12 standard concrete blocks stacked as shown. You can use more or less blocks, or different sizes, to adjust the height to suit your preference.
As you can see in photo 2, the top surface is lined with firebrick to protect the concrete. Ordinary concrete does not stand up well to the kinds of temperatures that you will generate on a coal forge, so you'll want to protect it as much as possible. Even with my firebrick lining, though, the bottom still gets pretty hot, and I have had some cracking, which is why I used a double layer of stones on the top.
The wall where the air inlet (tuyere pipe) comes through is very simply constructed using fire bricks stacked in an alternating fashion for stability.
The tuyere pipe itself is simply a length of 1-1/2 inch diameter black pipe, about 20 inches long. One very important thing that everyone reading this should already know: don't use galvanized pipe. The galvanizing will burn off and produce very toxic smoke. Galvanized metal should never be on your forge.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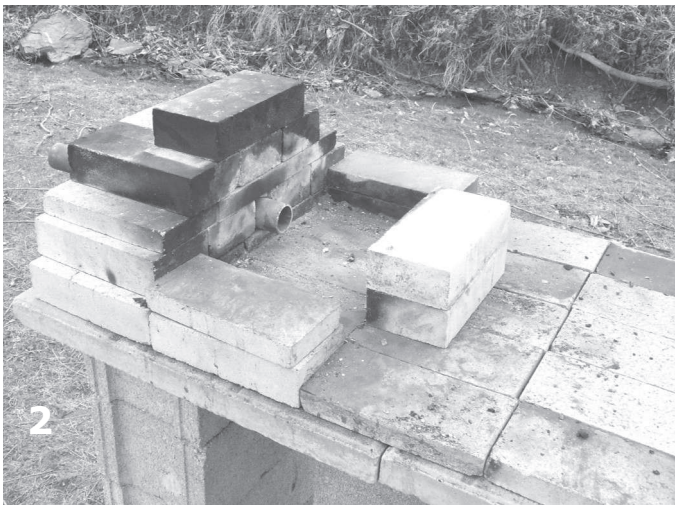
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You can see that the pipe is poking out of the wall a few inches, which was the way it was shown in Randy's book and other sources that I'd found. I'm not exactly sure why this is, but I suspect that the wall may absorb some of the heat from the fire if you run it flush. The other end simply sticks straight out of the back side; that is where I attach my blower.

Another thing you'll notice is that the pipe is raised an inch or so above the surface of the work platform. This, I think, is mostly for klinker control. In bottom-blast forges, the klinker tends to lay on top of the tuyere where it will gather and eventually block the air flow unless you clean it out. In a side-blast forge, the klinker is generated in front of the pipe, and raising the pipe allows it to settle below the pipe's end, which helps to prevent clogging. If I do get klinker build up in front of the pipe, I normally just insert a long steel rod from the other end and push it out of the way; this seems to be sufficient for most work.

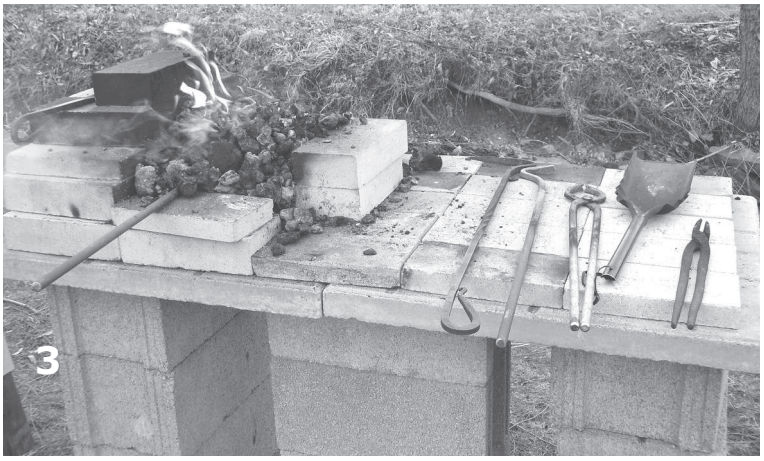
One final note on the tuyere pipe: if you look closely, you'll see that the end appears rough. Basically, it's burning away. This is expected. As I learned through some additional research, modern tuyere pipes on side-blast forges are usually hollow and connected to a water reservoir which keeps the pipe cool and prevents burning. Doing that, however, would have complicated my forge's construction considerably, and it really wasn't necessary. I just let the pipe burn away and push it further in when I need to. I know I'll have to replace it eventually, but I only do blacksmithing in my spare time, and this length of pipe has already lasted me a couple of years.

I also have fire bricks stacked on each side to help contain the fuel and support the work at the proper height in the fire. On a side-blast forge, the hottest part of the fire tends to be just in front of, and slightly above, the end of the pipe. This is generally where you will want to keep your work. In photos 3 and 4, I have my fire burning, and you can see how the piece I'm working on is resting on the front firebrick stack, to keep it at the right height, and is spaced out the appropriate distance from the wall to keep it just in front of the tuyere pipe. My coal reserve rests opposite the tuyere pipe, and I control the size of the fire by wetting down the reserve, just like on any other forge.

Of course, you'll also need a blower to supply the air. I started with a home-made blower that I built using some plans off of the internet, but I upgraded about a year ago to the Canady-Otto hand-crank blower that you see in photo 3. My connection to the tuyere pipe is simply 3-inch flexible (metal) duct and metal tape.

I already had the patio stones, concrete blocks, and some of the firebrick, so the total cost to me was about $40 (not counting the blower). Even if you had to buy it all, it would still be quite reasonable. All of the pieces are dry-stacked without mortar, so I was able to put it together in under an hour. Also, since no mortar is used, the forge can be easily moved or reconfigured to suit your work.

This forge may look primitive, but it works quite well. The heat output has been sufficient for anything that I have wanted to do so far--including forge welds on 1/2-inch square stock. If you have only worked on the bottom-blast forges, it may take some getting used to, but, personally, the more I use it, the more I like it.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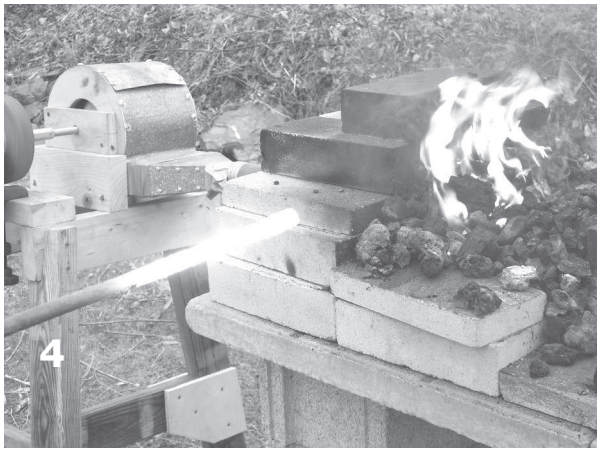
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