

Restoring Vintage Blacksmith Bellows: Two Examples of repairs made to vintage forge bellows.

Bellows A: This was purchased from a Long Island NY antique dealer around 1980. It is probably dated 1850-1870 based on the wood work, iron fittings, and weight of materials used. The characteristic teardrop shape had an overall length, including the metal nozzle, of 65 inches, and at its widest 33 inches. The pine planks which made up the three main boards of its air chambers were 1 3/8<sup>th</sup> inches thick. They were butted together with thin a wood spline and glue, with heavy battens nailed across the width to maintain flatness. Ninety percent of the bellows was in good shape. The major damage from age which required reconstruction included rotted wood on the outer plank of one side of the top board where the iron pivot rod entered the center board. The rusted nose pipe needed complete replacement, and all existing leather had to be removed. I decided early on against using genuine leather for because it was unlikely I would find an adequate source. I also considered leather too stiff and difficult to fit the complex shape required. I chose an inexpensive but high quality vinyl upholstery substitute that was finished to resemble leather. This would be more flexible in cold weather and be easier to repair.

After stripping the remains of the leather, removing all nails, tacks, screws, etc that had been imbedded in the original wood I was able to separate the three main boards examine them, and decide on a sequence of repairs. The two “floating ribs” which held the leather in each chamber were too fragile to use again and were discarded. I decided instead to use 3/4 inch modern plastic plumbing pipe as the substitute material. This is extremely lightweight, flexible, and can fastened with screws much like pine and other soft woods. These decision greatly simplified the remaining resoration.

The rotted wood was replaced by new stock cut and fit to retian the original profile of the boards. A new tapered steel tube nozzle was forged and brazed from 1/16 inch stock to replace the original. This nozzle is held in place by a number of tapered wedges driven in with caulk or other adhesive to form a secure fit. The original iron retaining ring at the base of the nozzle was in good condition and wedged in place after securing the nozzle tube.

Three original air valves were in bad condition and were discarded. Each valve had covered a round hole 3 to 4 inches in diameter. Two valves were placed over round holes inside the bottom board, and one placed inside the

center board. Having the extra hole in the bottom board allows that chamber to fill quickly when the hoist rope is dropped, and avoid pulling flammable hot air backwards from the fire. These valves were all replaced by rigid 1/8 inch plywood cut square and covered with a soft valve cushion (the same material used for the bellows sides). They were kept light weight so that they would provide little or no resistance to the circular flow of air as the chambers were filled and emptied in operation. They were also positioned so that they would not jam or flip upside down when the bellows was in operation. While the boards were unassembled, all internal wood surfaces were cleaned and covered with a coat of exterior polyurethane.

The most critical decision was to determine the shape of the skins that would cover the completed superstructure. I had no guidance on this, except to examine the remains of the old leather and guess from there. There was evidence of seams sewed at various places, but it was impossible to discern what the new leather looked like when it was being applied initially. I made a tiny cardboard model of a bellows and used paper as a pattern. I determined that the "leather" skin had to be cut in two separate segments (for the top and the bottom) and that each segment would take the form of that shown in Figure 1.

The length of A is half the distance around the girth of any of the three boards, assuming they are of identical dimension. Length B is the distance the bellows will open when fully extended. It is measured from the midpoint of the girth of the centerboard to the midpoint of the girth of the top and bottom boards.

Figure 1: patterns for bellows "skin" when upper and lower chambers are identical.

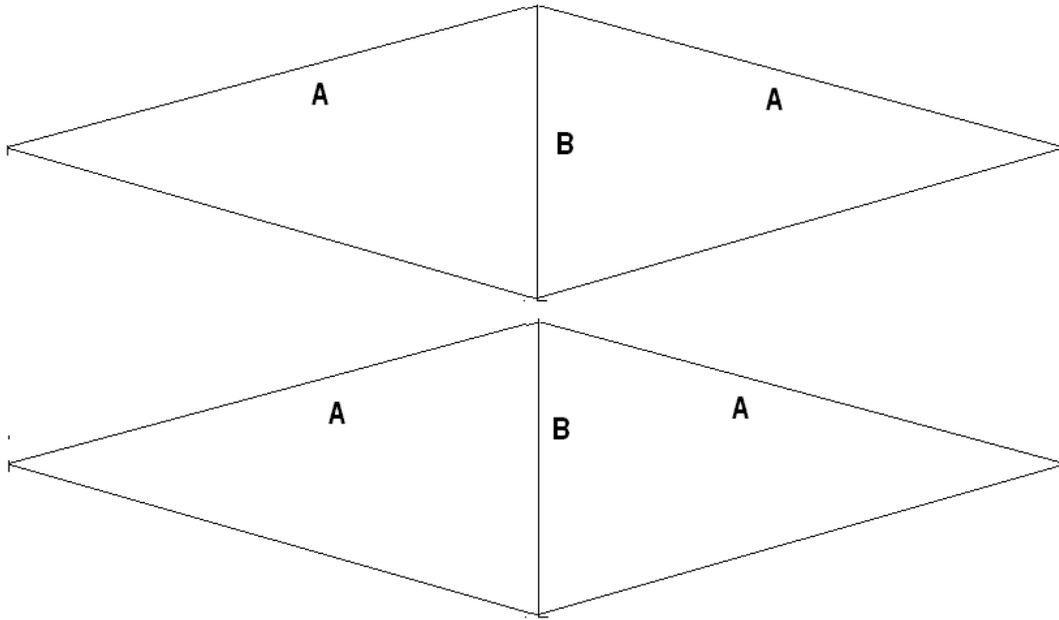


Figure 2: top and side view of bellows frame

