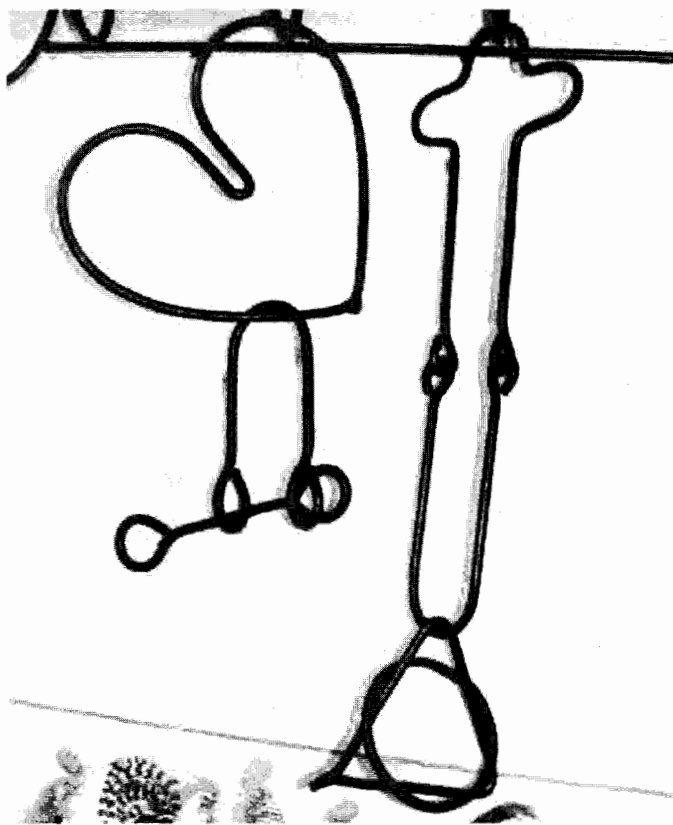


## Two Blacksmith Puzzles



The "Heart & Shackle" and the "Conestoga Wagon" puzzle

Article, drawings and photos by:  
Roger King, newsletter editor for NOB

*I learned these puzzles from Steve Anderson, a MABA member, at the 2005 Black Iron Days festival. (Black Iron Days is held at Hartwick Pines State Park near Grayling, MI.) Steve made them with me at the festival, and later shared the dimensions in a private letter. Steve also found a very similar puzzle in a museum.*

The first is the "Conestoga Wagon" puzzle. The object of the puzzle is to remove and replace the round ring from the rest of the puzzle (which resembles a Conestoga wagon tongue, hence Steve's name for it). I've made a number of these puzzles and displayed them at reenactments. The world seems to divide into those folks who already know how to do it, and those who can't figure it out. It's always fun to watch them try.

The puzzle is made entirely from 1/4" round. A bending fixture is also handy - this consists of a scrap of 1" OD pipe (3/4" trade size) plus a scrap of 1-3/8" OD pipe (1" trade size) welded to a hardy stem or chucked in the vise. My bending fixture is included in the sketches. Here are the four parts of the puzzle, along with the lengths to cut:  
Round Ring, 10"  
Equilateral Triangle, 12-3/4"  
U-link, 15"  
Wagon Tongue, 23"

Start by forming rings on both ends of the U-link (15") and Wagon Tongue (23") pieces. The rings are made by measuring off 2-1/4" at the end, bending a 90-degree turn on the anvil edge, and then turning the ring over the horn. See *Conestoga Wagon Puzzle drawing, sketch #1*.

The Wagon Tongue is formed starting with the bends shown in *sketch #2*. Measure 4-1/4" in from a ring, bend a near right angle, measure 3-1/2" more and make another near right angle, and then do the same process working from the other end. It is not important to make exact right angles, as illustrated. The material left in the center ("rest") will measure about 3". The bending jig is next used to make the three loops in the Wagon Tongue. Heat the central 3" first, eyeball its center while holding the ends with your two hands, and wrap it around half the circumference of the 1-3/8" diameter fixture. The result should look like *sketch #3*. Next heat one of the 3-1/2" sections and bend it halfway around the smaller fixture, followed by the other 3-1/2" section. You should end up with the Wagon Tongue piece in *sketch #4*.

The U-link piece is straightforward. Heat it in the center and bend it around the larger bending jig. This is the part in *sketch #5*.

Make the Ring by scarfing both ends of the 10 inch piece, turning a smooth ring, and then welding the ends together. (Sounds easy, doesn't it?) A helpful hint Steve gave me was to set the un-welded ring in the step of the anvil and bend it (cold) near each end to put a bit of "preload" in it so that the ends are pressing together before doing the forge weld. It doesn't matter if this bends up the ring, it is worked back to round in the process of finishing the forge weld, *sketch #6*.

The Triangle is welded in a similar manner. The two ends are lapped over each other to form a short tab at one apex of the equilateral triangle. As with the ring, bend as needed to preload the two ends before welding, and work it back into shape when completing the weld, *sketch #7*.

The final step is to assemble the pieces. Clamp the U-link in the vise and cold bend its two end rings just enough to open them. This may be done by twisting them with a wrench. Assemble the Triangle and Ring onto the Wagon Tongue, hook its end rings into the U-link end rings, and twist them back to complete the puzzle. Note that the Ring goes onto the Wagon Tongue first and passes over both legs, but can't fall off the tongue end because it won't pass over the three loops at that end. The Triangle goes onto the Tongue second and goes over only one leg of the Tongue.

The object of the puzzle is to put the Ring on and off of the Wagon Tongue without resorting to undue violence.

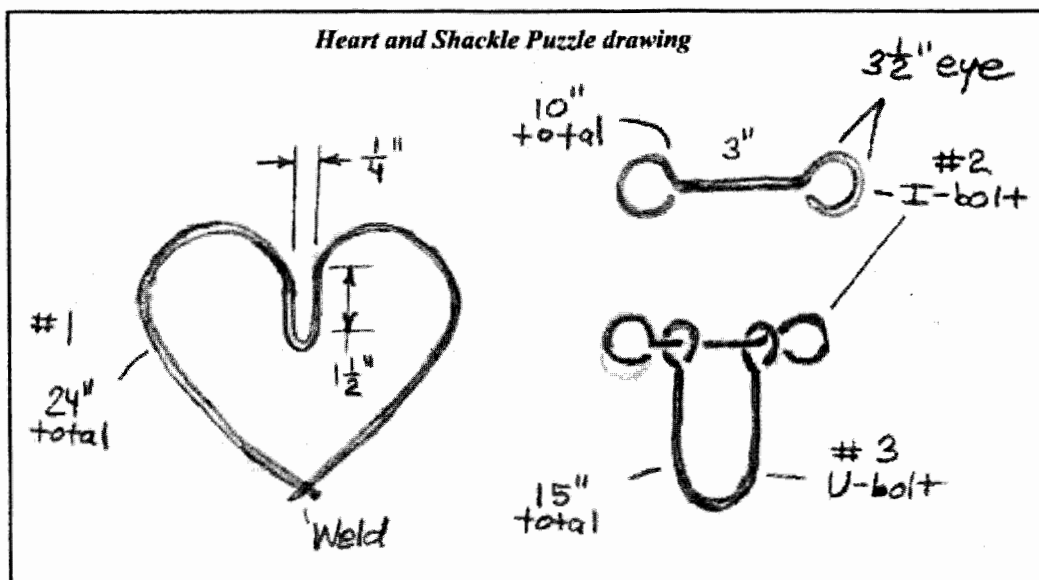
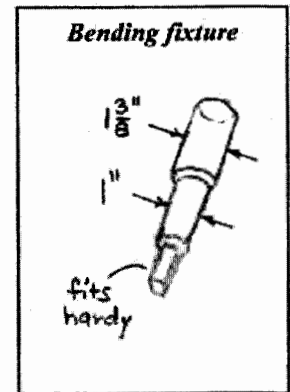
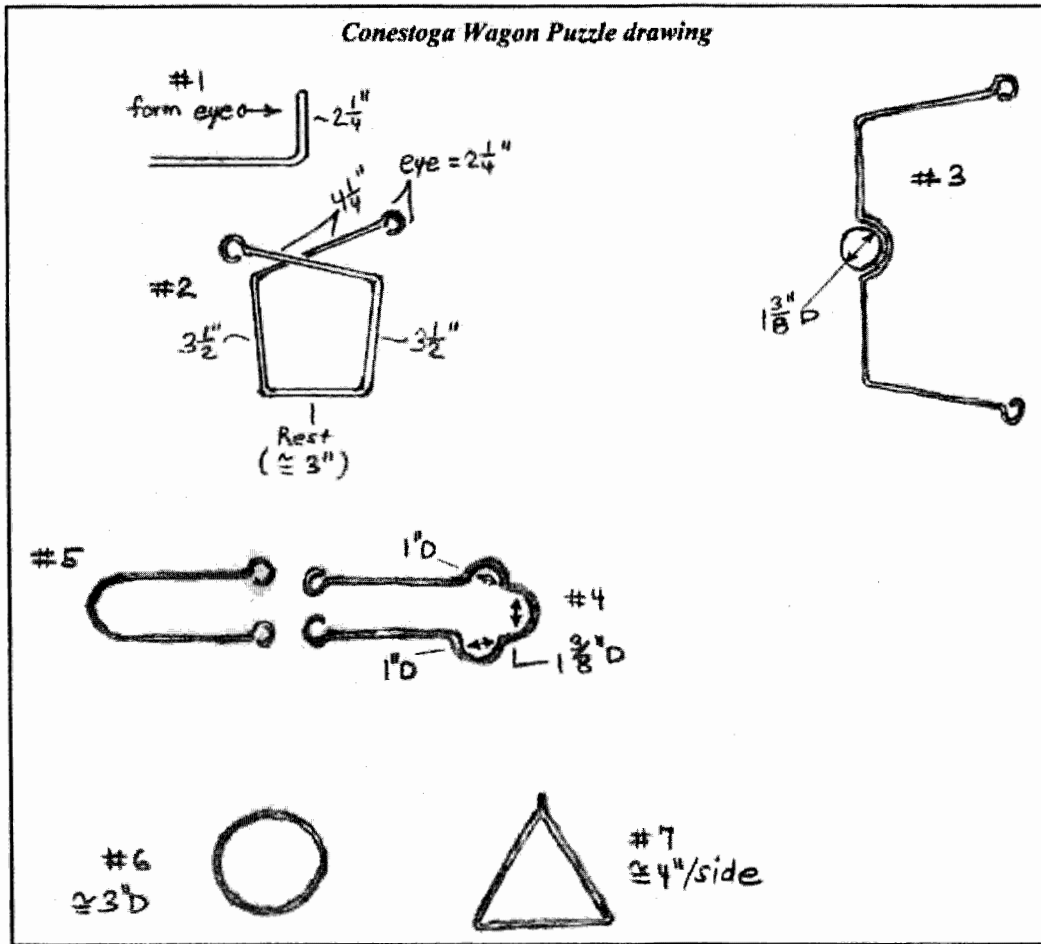
The second puzzle is the "Heart and Shackle." The object of this puzzle is to remove the U-bolt/I-bolt assembly from the heart.

This puzzle is also entirely made from 1/4" round. The lengths to cut:  
The Heart, 24"  
I-bolt, 10"  
U-bolt, 15"

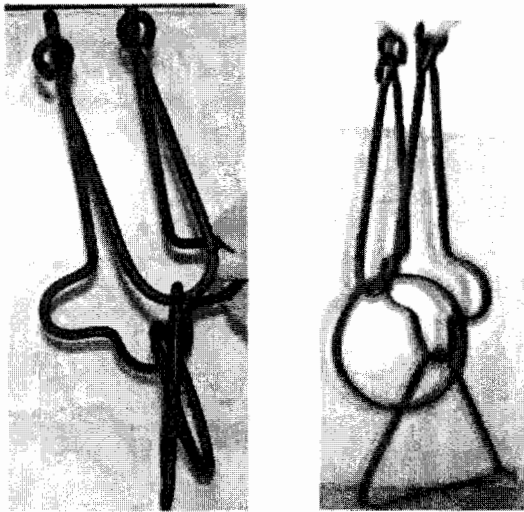
To form the Heart, clamp a scrap of 1/4" rectangular stock into the vise for use as a spacer. Begin forming the

Heart by wrapping the 24" piece of stock at its center around the spacer. The rest of the heart can be formed freely to look like a heart, and then welded at the tip of the heart. The important dimensions are indicated in the *Heart and Shackle Puzzle drawing, sketch #1*. The 1/4" spacing should allow the 1/4" round stock to pass through easily. The length of the spaced section needs to be about 1-1/2" as shown. This is where the shackle is put onto the heart.

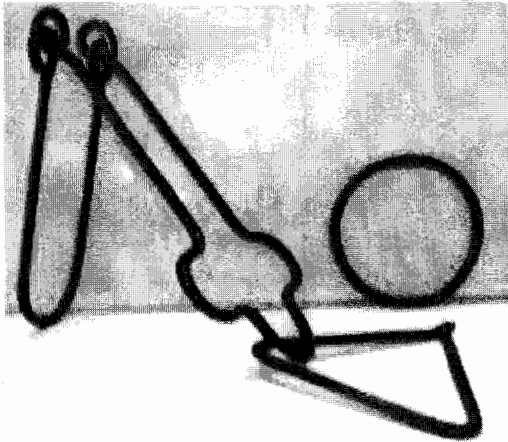
The ends of both the I-bolt and U-bolt are formed by measuring off 3-1/2", bending a sharp right angle on the anvil's edge, and then turning the ring on the horn. The other dimensions are not too critical. See *sketch #2*. The I-bolt is assembled into the U-bolt as shown in *sketch #3*. The turn in the center of the U-bolt may be made over 1" trade size pipe (about 1-3/8" diameter). This is the same jig that was used for the Conestoga Wagon puzzle.



**To solve the Conestoga Wagon Puzzle...**



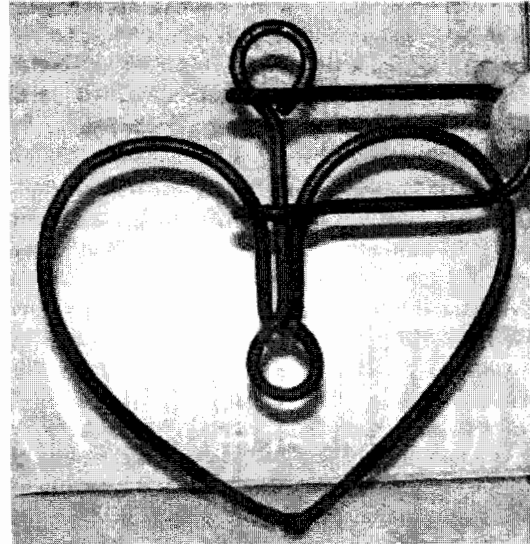
Fold in half, slide ring up to the top, run it around the outline



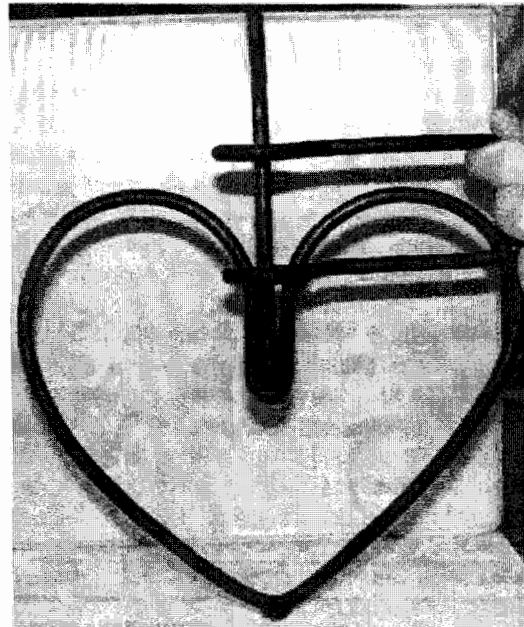
and off comes the ring.

Note: For reference, The Conestoga Puzzle is pictured in:  
The Blacksmith, Pennsylvania Historical and Museum,  
Harrisburg, PA. 1976, p. 60.  
Library of Congress cat. No.75-187815.

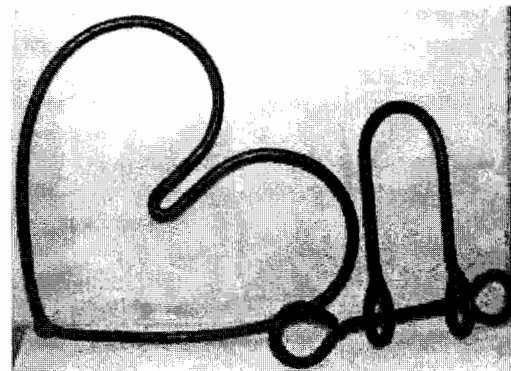
**To Solve the Heart & Shackle Puzzle...**



Take the shackle ring and work it up the stem of the heart.



Turn the key part of the shackle so that it fits between the stem of the heart and the ring of the shackle.



Push the key part of the shackle through the heart stem to remove the shackle from the heart.