Plumbing Part II - Hand Pump

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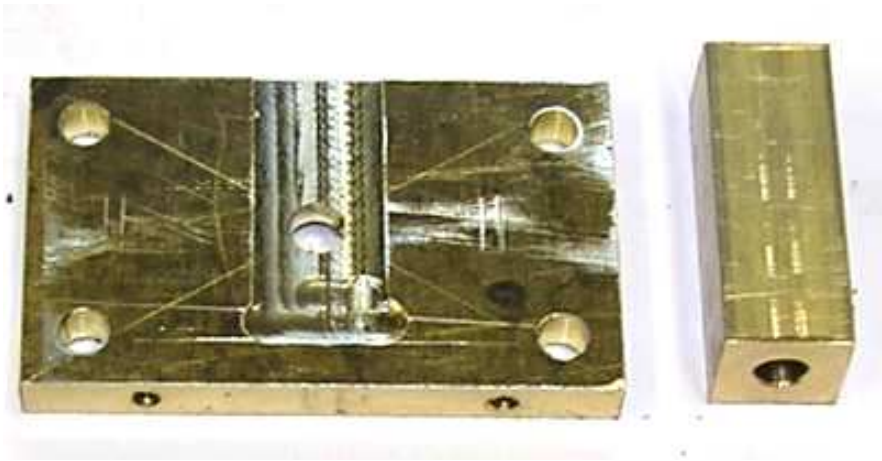
The hand pump located in the tender water tank is a backup pump should the axel pump fail or if the locomotive has been under steam but not moving. The hand pump was built first so that the tender tank could be finished. Kenneth's design was followed except for the cylinder; a 1" diameter rod was bored to exactly 3/4" so that could use standard 3/4" OD 9/16" ID O-Rings could be used. Kenneth suggests a 3/4" brass pipe nipple.

The lathe work was done first. The next photo shows the collection of parts after the lathe work.



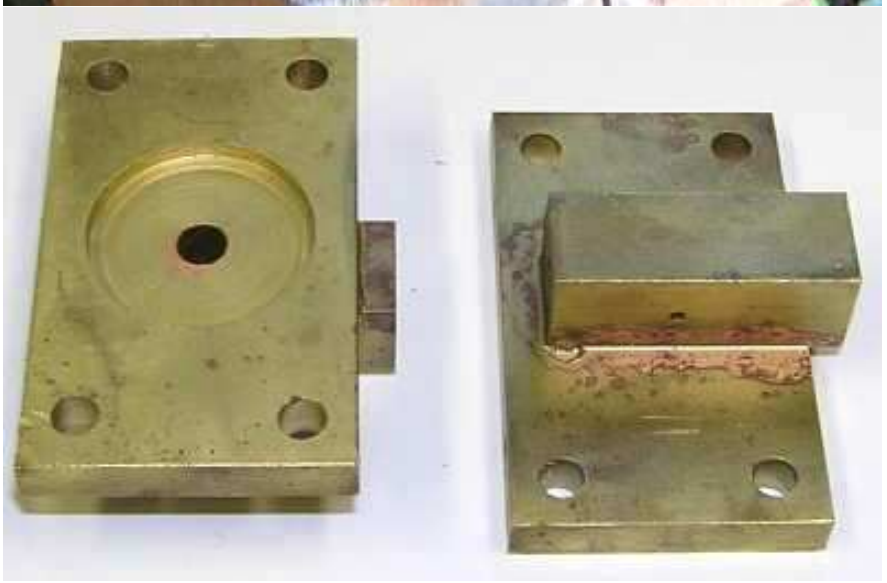
End Plates: A 0.025" deep slot was milled in the end plate to match the square piece. This was done so that everything would stay aligned when the two pieces were soldered together.

This shows the setup for the soldering. Both pieces were coated with flux and a flat piece of silver solder sandwiched between. The weights keep everything together when heated.

(This photo sort of reminds me of dealing the the IRS --- that's me on the bottom.)

These are the finished end plates. They've been cleaned up some by bead blasting. The flux etches pretty deep so I gave up on cleaning them perfectly. The photo shows the nice silver solder fillet at the joint.

After the soldering the 1/16" hole was drilled in the side of the square part for the pin to retain the lower ball in position. The 7/32 hole was also drilled through from the rectangular part into the square part. A 17/64" reamer was run down the square part to remove any burrs after these holes were drilled.



The pump outputs are threaded NPT 1/8"-27. It was decided to convert to 1/4" tubing at the output and to use compression fittings for the tubing. A

1/8" NPT to 1/4" tubing compression fitting elbow was used on one output and a tee with 1/8" NPT on the side and 1/4" compression fittings on the ends for the other output. Inspection of the 1/8" NPT ends revealed that the 5/16" ball on the pump output would probably press into the pipe fitting and seal the output. This was remedied by filing a slot in the ends of the fittings as shown on the right.

Cylinder & Pivot Point: Slots were milled in the side of the cylinder for the clevis pin hat will drive the piston. The triangle plate fits in the slot in the top of the cylinder and will be the pivot point for the handle.

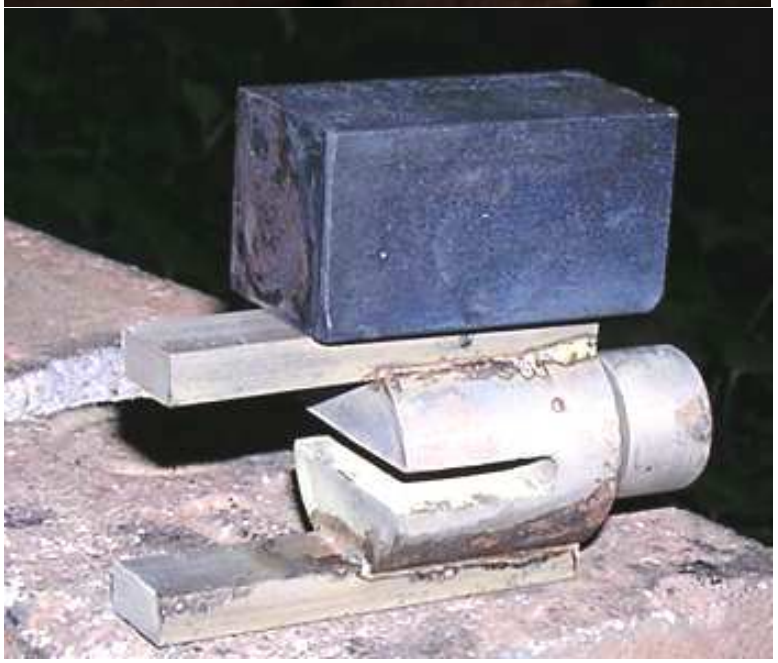
The slot and the bottom of the triangle piece were coated with flux, pieces of flat silver solder were placed in the slot and the plate pressed into position. The pieces were then heated. After the solder flowed the triangle piece was tapped with a hammer to make sure it was seated in the slot. The slot makes a neat way to keep the two pieces in position during the soldering and makes a really strong joint.

Lower Handle: The lower part of the handle was made up of a

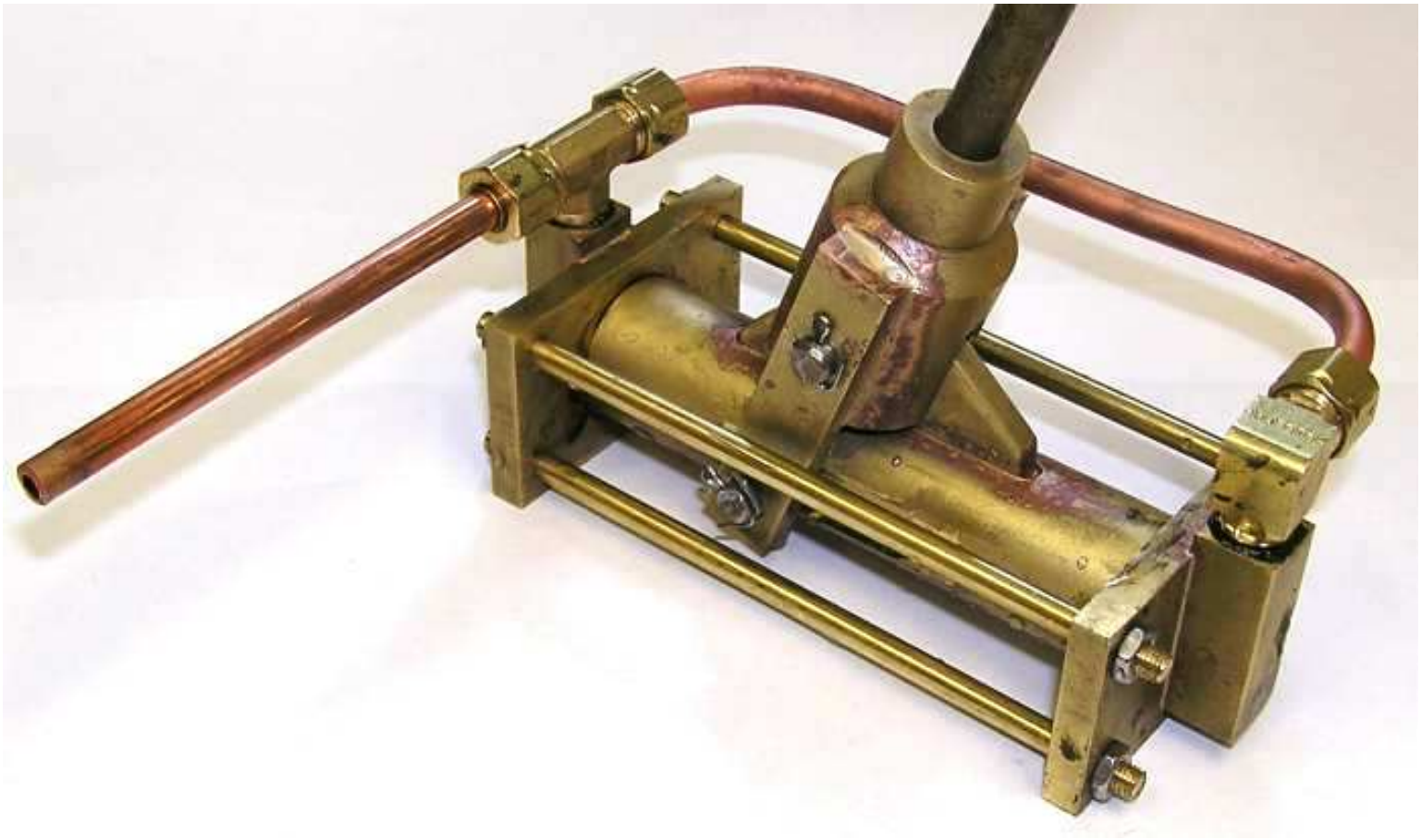
rod turned previously and a pair of bars soldered to the sides of the rod. A slot was milled in the rod so that it will slip over the triangle at the top of the cylinder. Slots were then milled in the sides of the rod to match the bars.

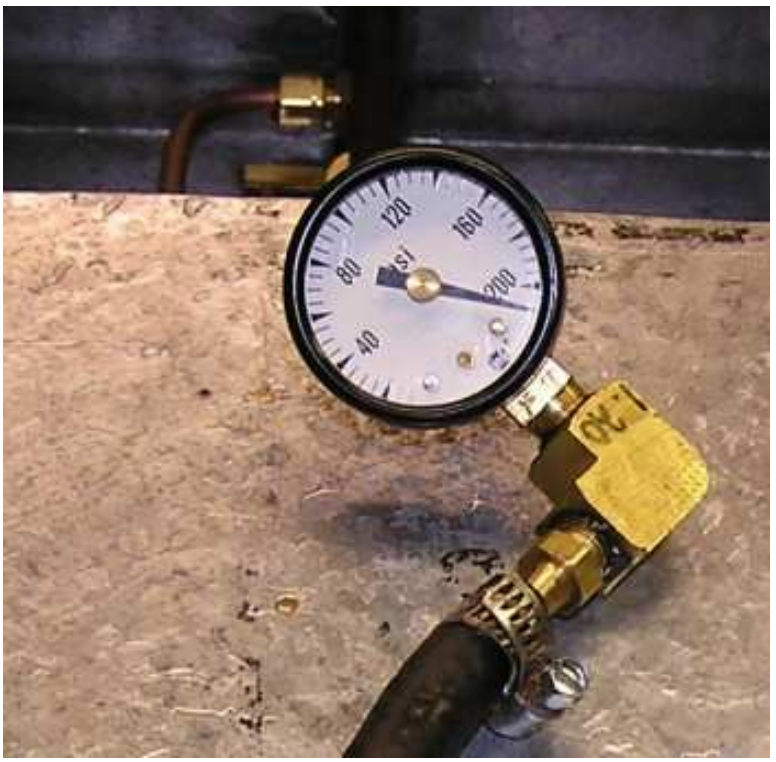
The joint areas were fluxed and strips of silver solder placed between the parts to be joined and the whole stack set on a brick with a steel weight on top to force the parts together when the solder flowed. This photo shows heating the parts. (It's night time)

This photo shows the parts after they were soldered.



The next step was to drill a hole through the lower handle with a matching hole in the triangle part of the cylinder for the pivot. A second set of holes were drilled through the lower part of the bars that match up with a slot in the piston. Two clevis pins were then made from stainless steel and everything was assembled. The completed pump is shown below.





A couple things I forgot to mention. Permatex Form-A-Gasket #2 was used on the pipe threads as suggested by Kenneth. I also used some between the cylinder and ends.

Update-Test: The pump was mounted in the tank and volume tested. It worked great. The output hose was then connected to the steam pressure gauge. The pump had no difficulty (after the leaks around the ends of the hose were repaired) building 200 psi pressure as seen in the photo.

Update-Handle: A telescoping handle was made from a 1/8" pipe nipple, a piece of 1/4" stainless steel rod, a pipe cap and a knob. A piece of 5/16" brass rod was drilled 1/4" and silver soldered onto the end of the rod. The brass was then turned to ~ 0.270", the ID of the nipple.

The pipe cap was drilled 1/4" allowing the rod to pass through but not the larger brass piece on the end of the rod. The hole for the handle in the pump was tapped 1/8" NPT to match the nipple.

The photo on right shows handle in the extended position. When pushed all the way in, the lid will close. The knob is from Lowe's.

Shay Home
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