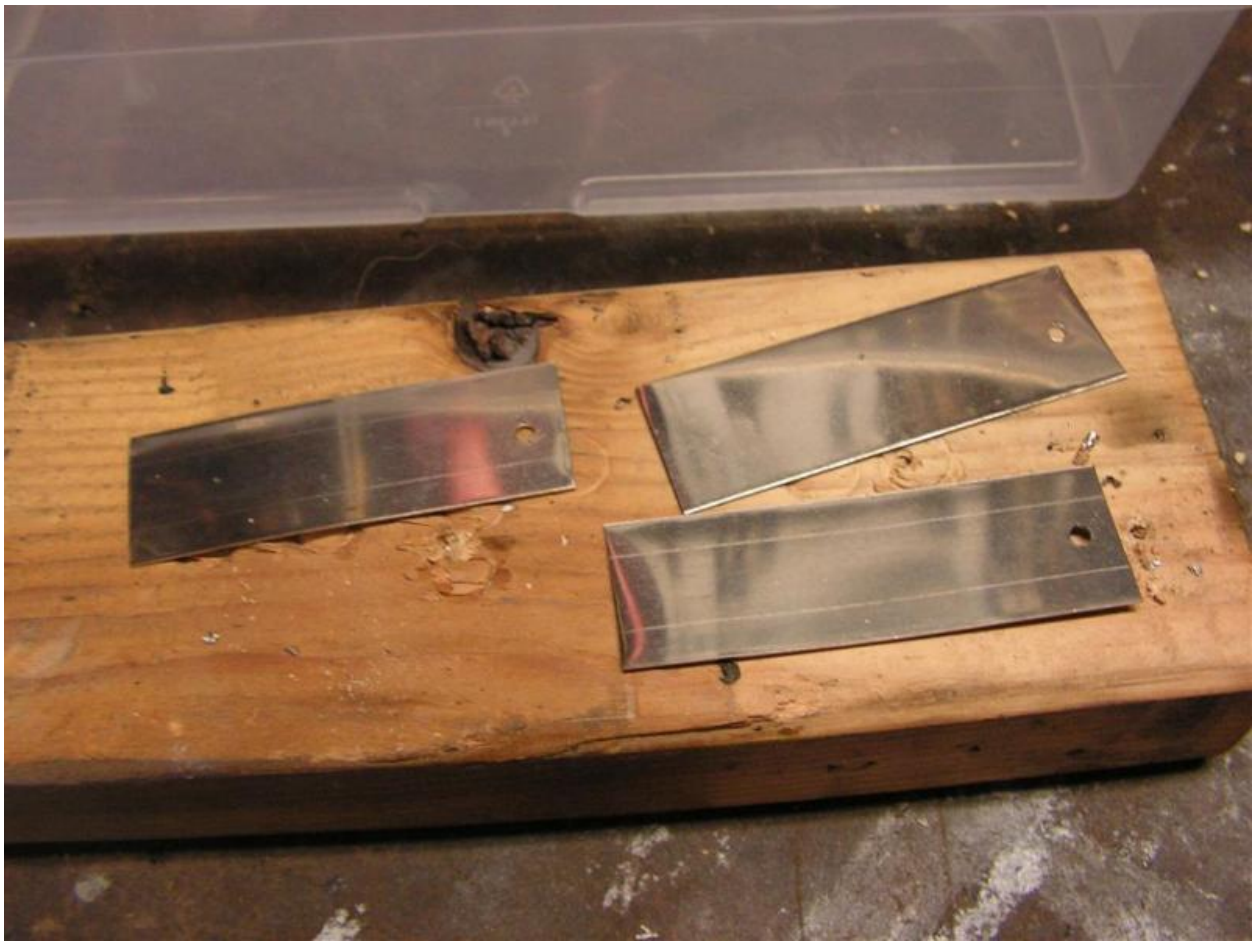
This is a small electroplating setup that I have used successfully over the years. I've scaled this design up to successfully plate larger parts, including a motorcycle fender and automotive gauge housings, and also scaled it way down to plate small machine screws and other hardware. Today I'm going somewhat small, since this plating process is designed to nickel plate larger sized fasteners and brackets for a car restoration.

Also, when I say that I've done "plating" with these setups, I mean mostly nickel and zinc plating. I've never attempted chrome.

First I needed a small plastic tub -- pretty cheap enough from Target. A lid is good, since it will allow me to store the plating solution safely when finished. This tub holds about 1 gallon of solution max, but I won't use that much -- maybe 1/2 to 3/4 gal. We'll address the plating solution later.

Next, I cut two 6" nickel anodes in half to produce four 3" strips (google "nickel anode" and you'll get plenty of offerings)



The anodes need to be firmly affixed to the exterior walls of the tub. To do that. I drilled some 1/8" holes in each anode and also 1/8" holes into one side of four clothespins. The IMPORTANT part here is that the electrical connections need to be as sound as possible. To that end, I cut 4 pieces of 14ga electrical wire to accept round crimp terminals, and mounted the wire and anode to the clothespins.

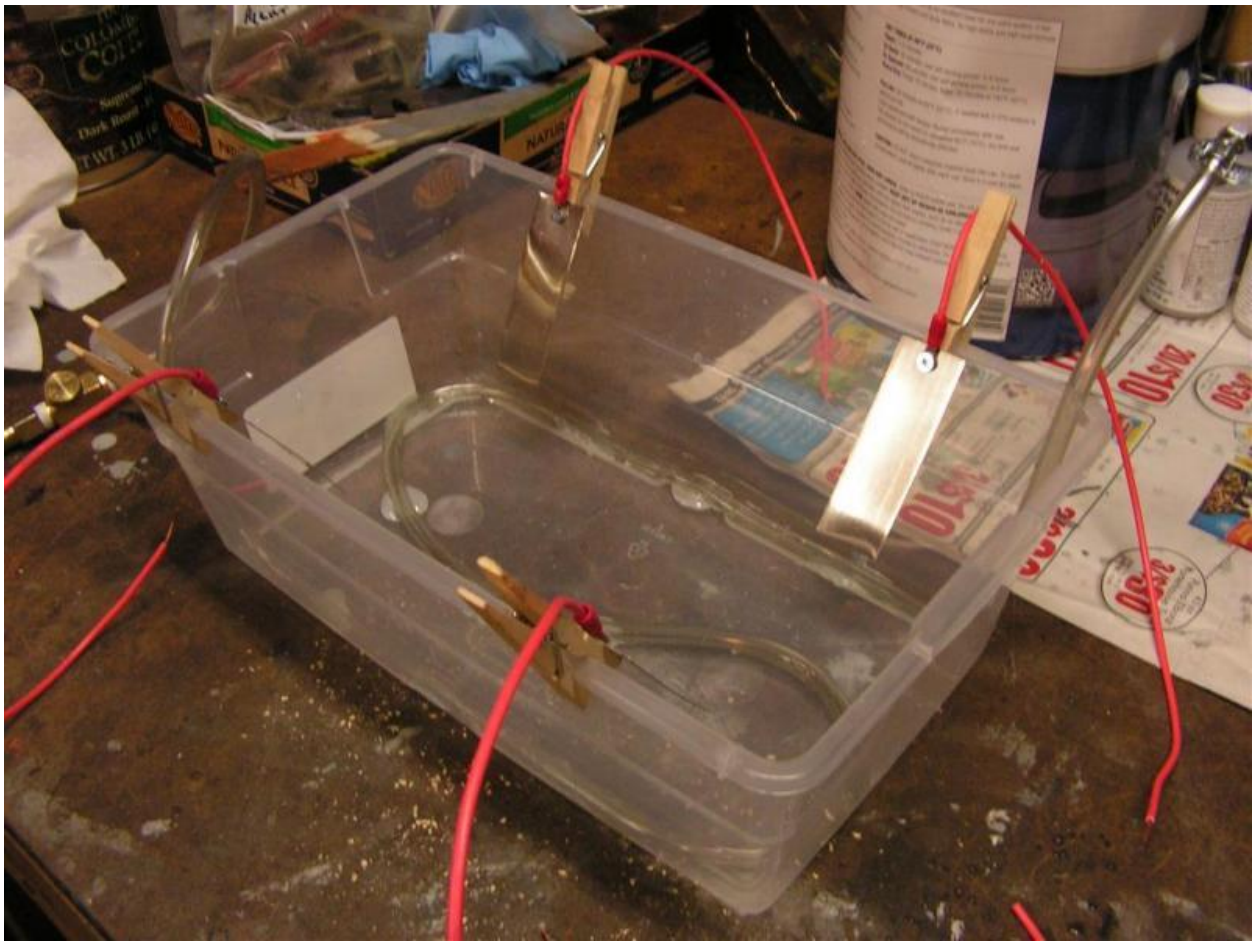
Next, I needed to build a "bubbler" for this tub. The bubble's job is to keep the solution agitated enough to make the nickel ions propagate evenly and steadily through the solution. You can plate without the bubbler, but the plating will most likely be uneven and spotty. If you want to skip the bubbler, then just use a wooden spoon to keep the plating solution agitated at a slow but constant speed -- but that can get tiring if you want to plate a good quantity of parts.

The bubbler starts out as 1/4" clear tubing that is hot glued into the bottom of the tub. The best solution is to use a curved wide "S" pattern to get good coverage of the base. I glue both end up the side corners of the tub so that there is plenty of excess tubing for connections and external fittings.

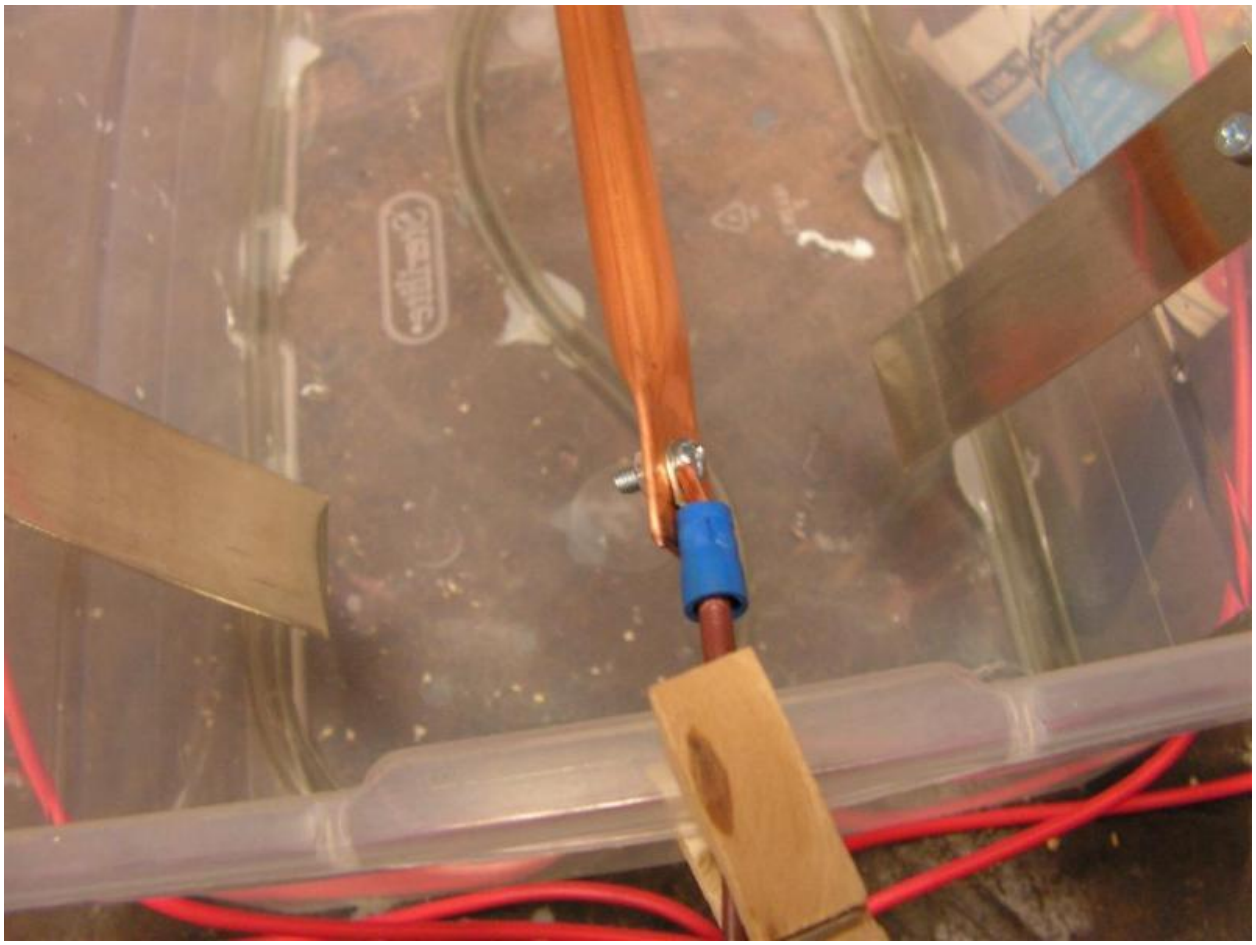
One end is capped with a bolt and a hose clamp, the other is attached to a barbed fitting and a small air pressure regulator. You want the end with the bolt to be removable in order to clear any remaining fluid from the bubbler tube during a complete cleanup. A quick burst of air and the tube will clear. Just don't put the metal end cap bolt in the solution itself -- it will contaminate the plating solution.

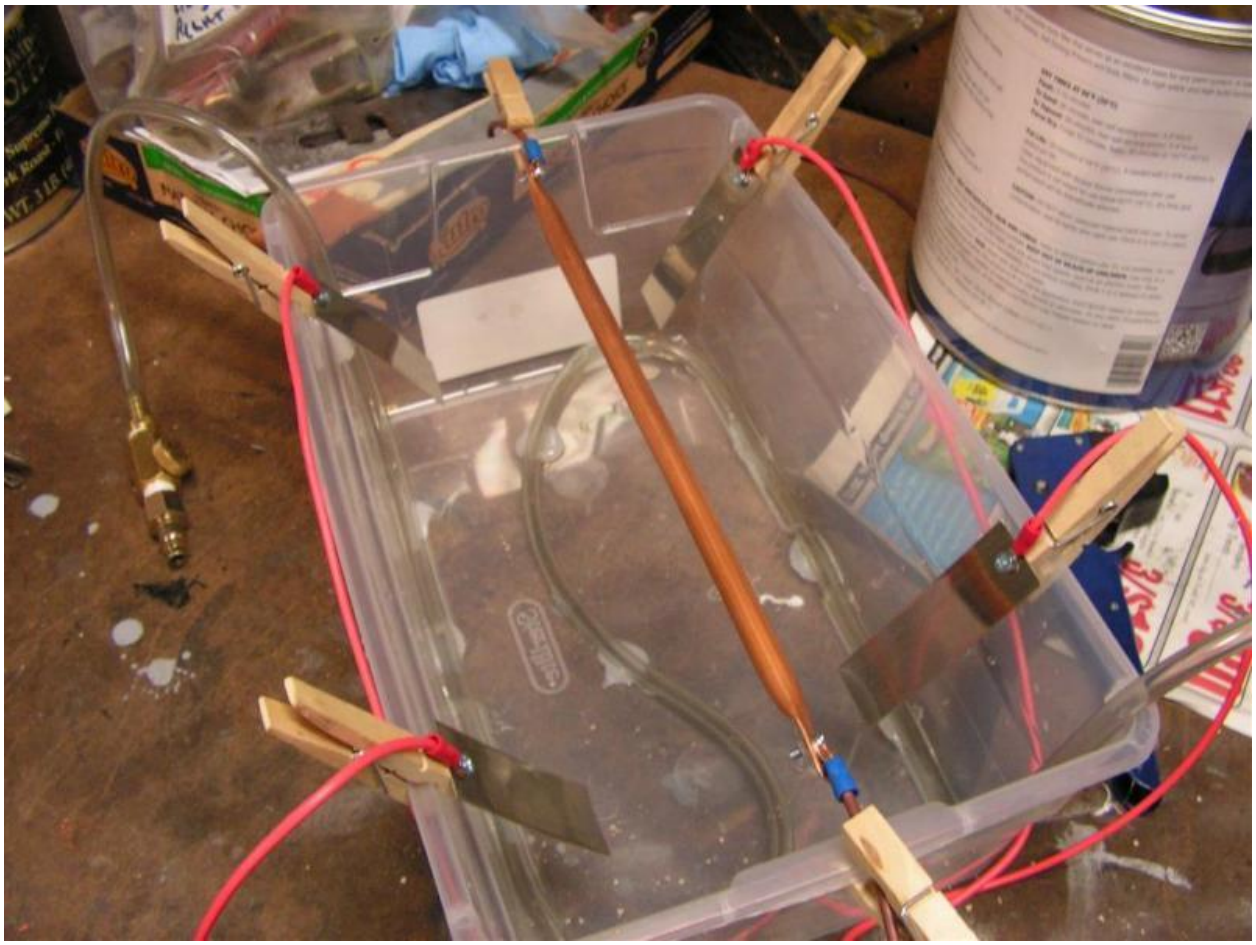
Once the tube is glued in place, I pressurize the tube with 10-15 psi and use a sharp pick to make five holes in the tube -- one in each corner and one in the middle of the tub.

Here is the first stage with all the positive anode leads completed –

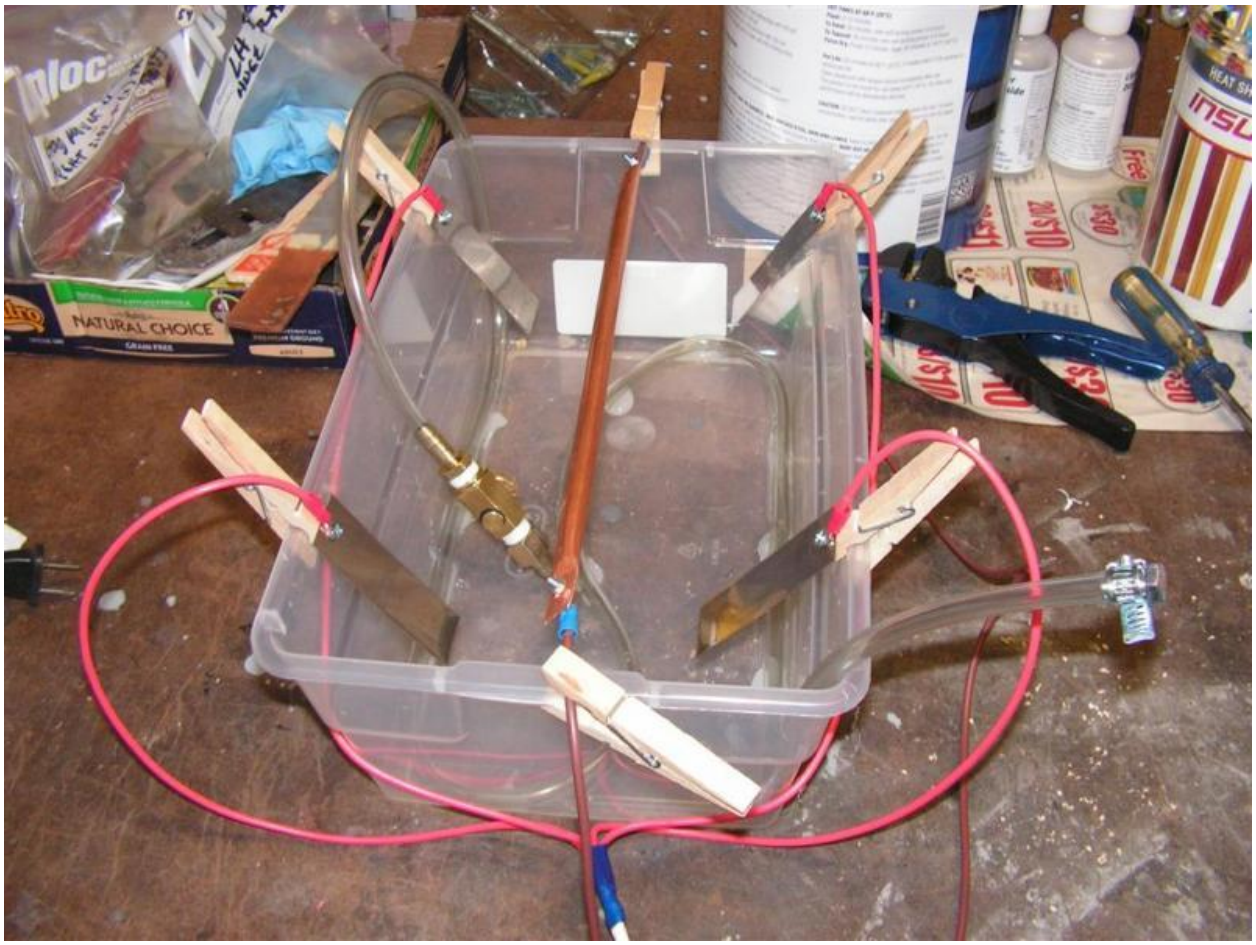


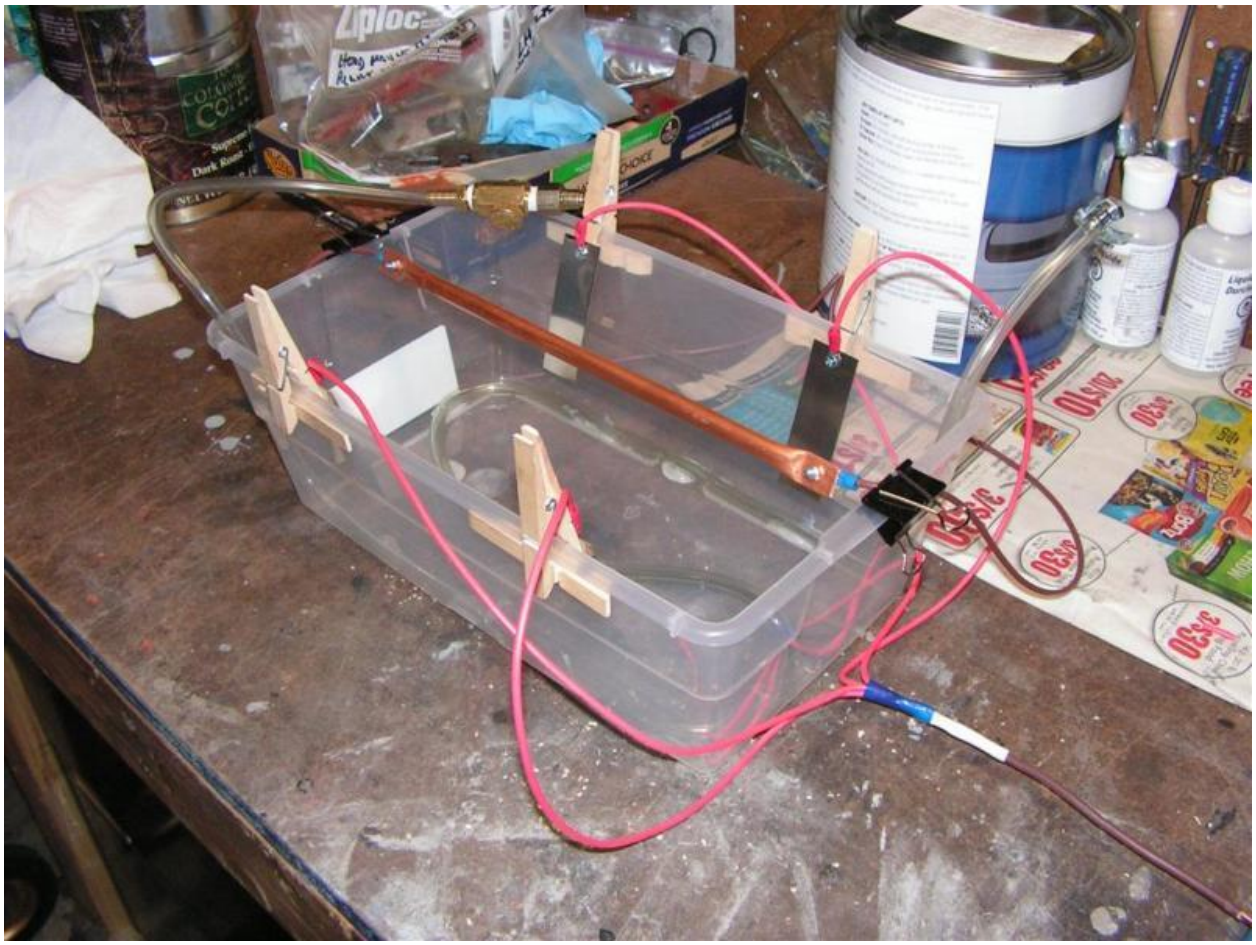
Next comes the cathode (negative) assembly. Here I used a piece of 3/8" flexible copper tubing and flattened the ends to again attach 14ga wire on each end with round crimp connectors. Again, I want the best electrical flow possible, so I used two connections instead of one.





Once all the positive and negative connections were in place, I terminated each of the negative and positive wire bundles into a larger gauge bus wire so that the electrical load can be easily distributed. This is overkill, but you don't want to take a chance with voltage drop in the plating process. Notice the bundled connections in the lower parts of the pics. These bus connections were soldered and insulated with shrink tubing.


NATURAL CHOICE



The plating solution for this nickel process is comprised of Nickel Sulfate, Ammonium Chloride and Boric Acid -- I didn't come up with this solution. It was gleaned from the following website -- http://www.substech.com/dokuwiki/dok...electroplating

It's the last category called "Hard Nickel Plating" --

Here are some of the specs for the process -- You can try the process without the boric acid, but in my opinion, the nickel becomes too brittle and will flake off much more readily; not something I want to happen to my frame and carriage hardware.

Bath composition:
Nickel sulphate, NiSO46H2O: 24 oz/gal (180 g/l)
Ammonium chloride, NH4Cl3: 3.3 oz/gal (25 g/l)
Boric acid, H3BO3: 4 oz/gal (30 g/l)

Operating conditions:
Temperature: 110-140°F (43-60°C)
Cathode current density: 25-50 A/ft² (2.5-5 A/dm²) PH: 5.6-5.9

Also, I've noticed that given the size of the container and parts, you can get great results with just a plain battery charger; so DON"T assume that maximum voltage and amperage will yield a good plating job. In fact, just the opposite is true -- in a small container, low voltage and low amperage yields the best results. So a small battery charger will suffice.

For big plating jobs that have a large surface area, you need more current and better control of voltage. A variable power supply like this Lambda has enough amperage and voltage to plate large pieces.

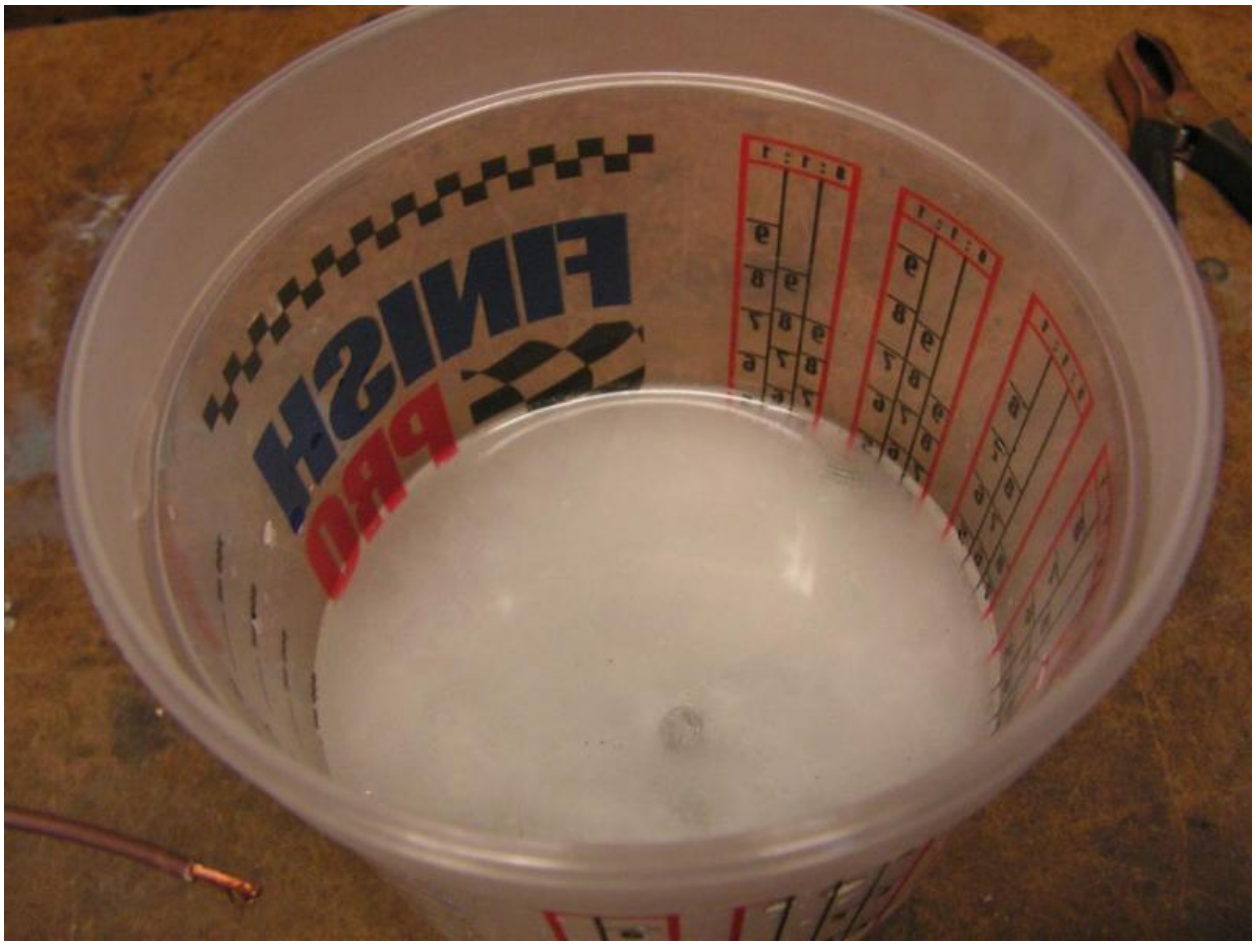
However, for small hardware and brackets, a small battery charger set at 2 amps and pushing 6 volts is sufficient for the job!

Ok, now it's time to do the prep work. Like everything with cars, it's the prep that takes the most time; the plating itself takes less than an hour. Here are the subframe bolts from my car. They show some flash rust and shadow corrosion.

First cleaning is done on the wire wheel. The rust and scale is wheeled off to reveal a nice clean finish. Every nut, bolt and washer gets wheeled -- Here are all the cleaned pieces. I used a protective mask and latex gloves to wheel this hardware since it was originally cadmium plated –

Next the remaining plating and micro-rust spots need to be removed by submerging the hardware in distilled vinegar. You can see that although these pieces were cleaned with the wire wheel, the vinegar reacts pretty aggressively with the remaining plating and rust.

NOTE: The fumes from this dissolving plating are dangerous, and they are quite strong -- you need ventilation; so I just set this cup outside in the fresh air and waited for two hours for the bubbles to subside.



Once the vinegar does its job, I rinsed the hardware in fresh water and what's left is a black loose oxide on the surface of the hardware.

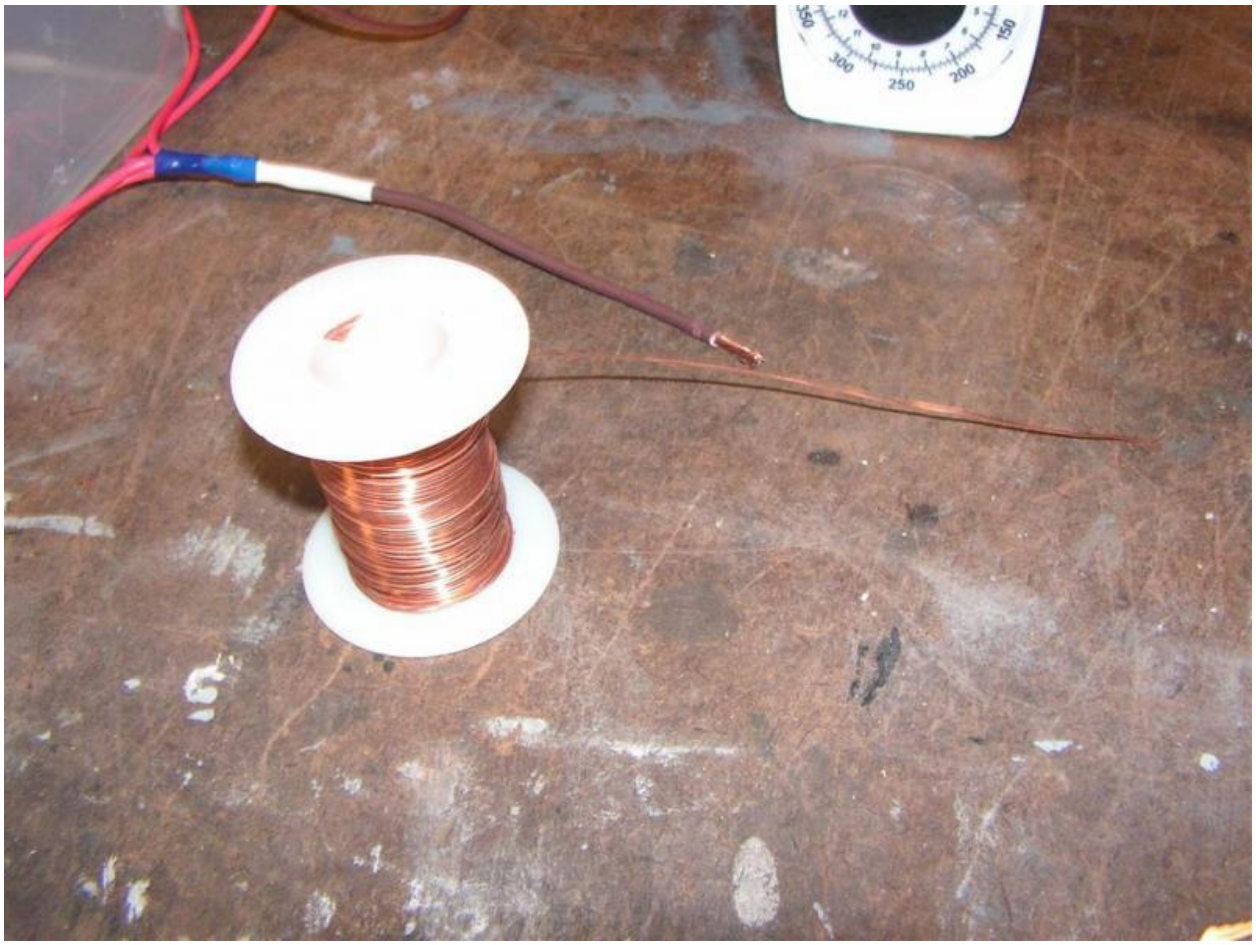

FINISH
PRO

Now it's back to the bench grinder and another wheeling session to get rid of the oxide coating. Now look at the comparison between the oxide and the wheeled hardware. What's left is pure virgin steel!!!

When all the hardware is wheeled, each piece is rubbed down with rubbing alcohol to remove the oil from my hands and fingers. I wear latex gloves for this process. If there's oil on the steel then it won't plate evenly.

Now let's set up the plating solution -- first a cheap kitchen scale, copper wire for hanging parts on the cathode rail (negative side), and distilled water. This is important. If you live in areas with mineral rich water (i.e. iron or high sulphur), then the plating may not work very well. To be on the safe side I always use distilled water.

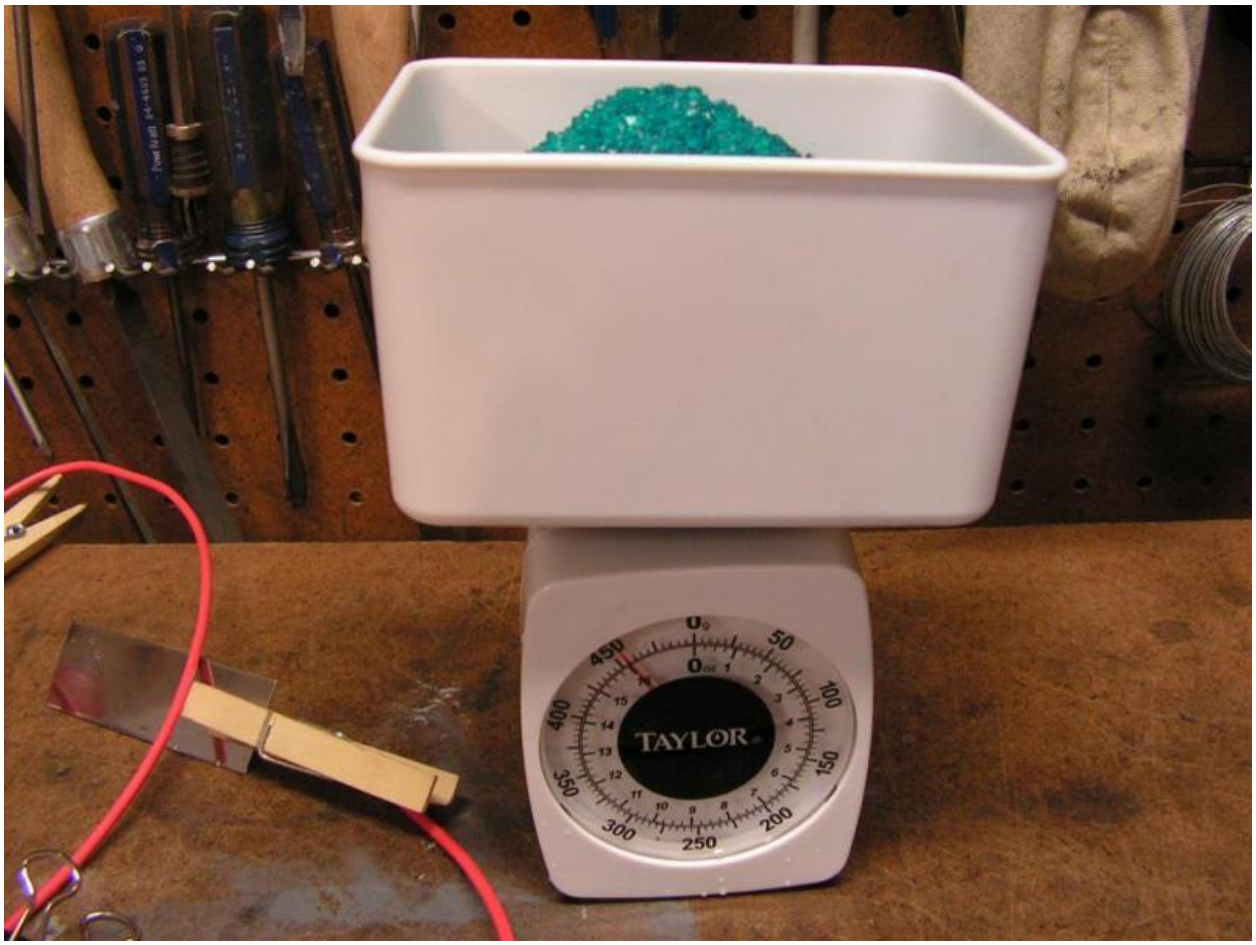

TAYLOR
0
50
100
150
200
250
300
350
400
450


300
250
200
150

I used a gallon of distilled water heated to 150F and weighed out the following proportions

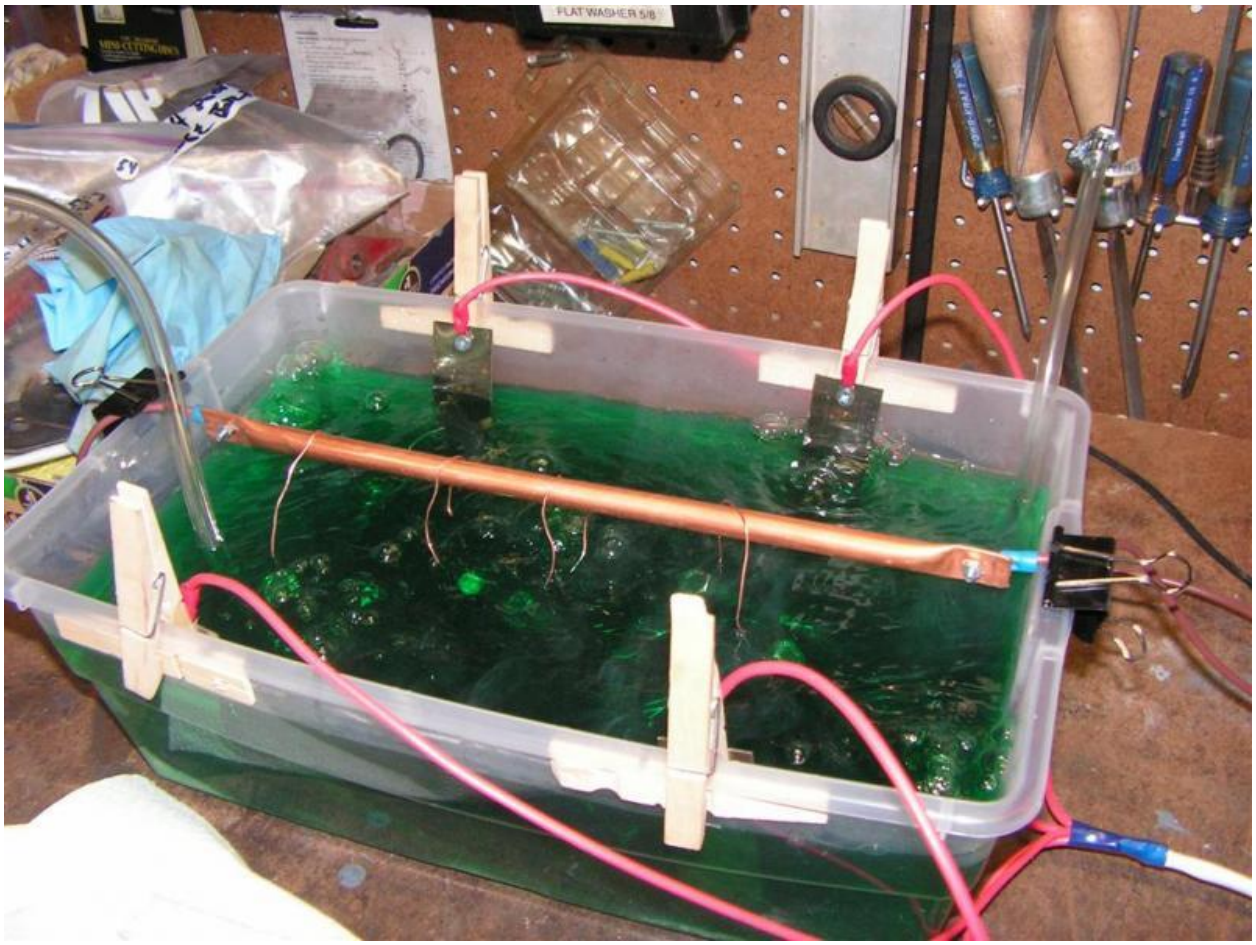
Nickel Sulphate -- 24oz
Ammonium Chloride --- 3.3oz
Boric Acid --- 4oz

Note -- wear gloves and a good dust mask when handling the dry ingredients –


TAYLOR

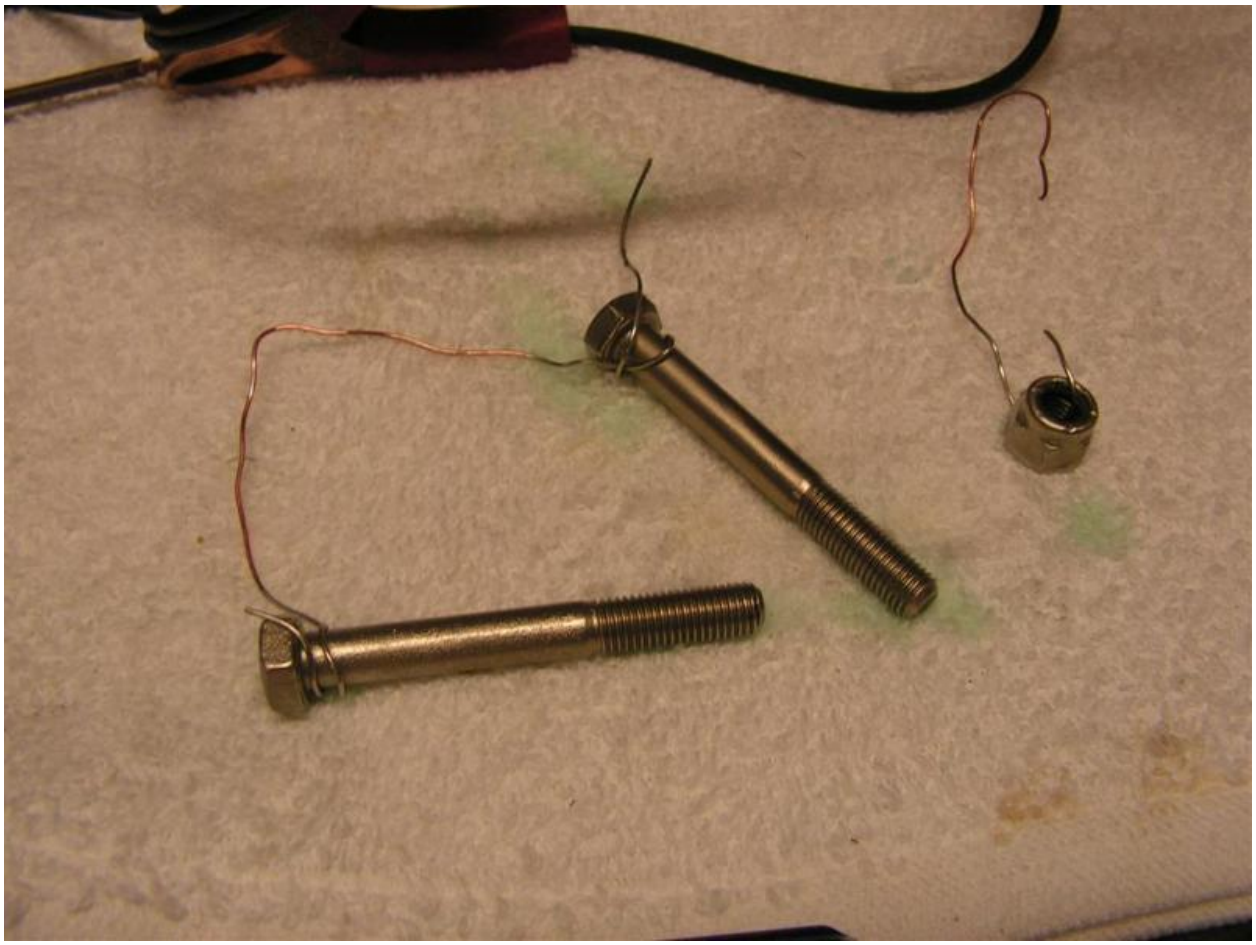
Everything was stirred slowly to make sure the ingredients dissolved properly, and then the rubbing alcohol cleaned parts were set up in assembly line fashion.

Now all the electrical connections are made, and the bubbler is started –



Plating nuts/bolts for too long will change the dimensions -- so you need to be aware that leaving the bolts/nuts in the solution for too long may make them useless, and you'll need to chase threads -- that leaves the bolts/nuts open for corrosion again.

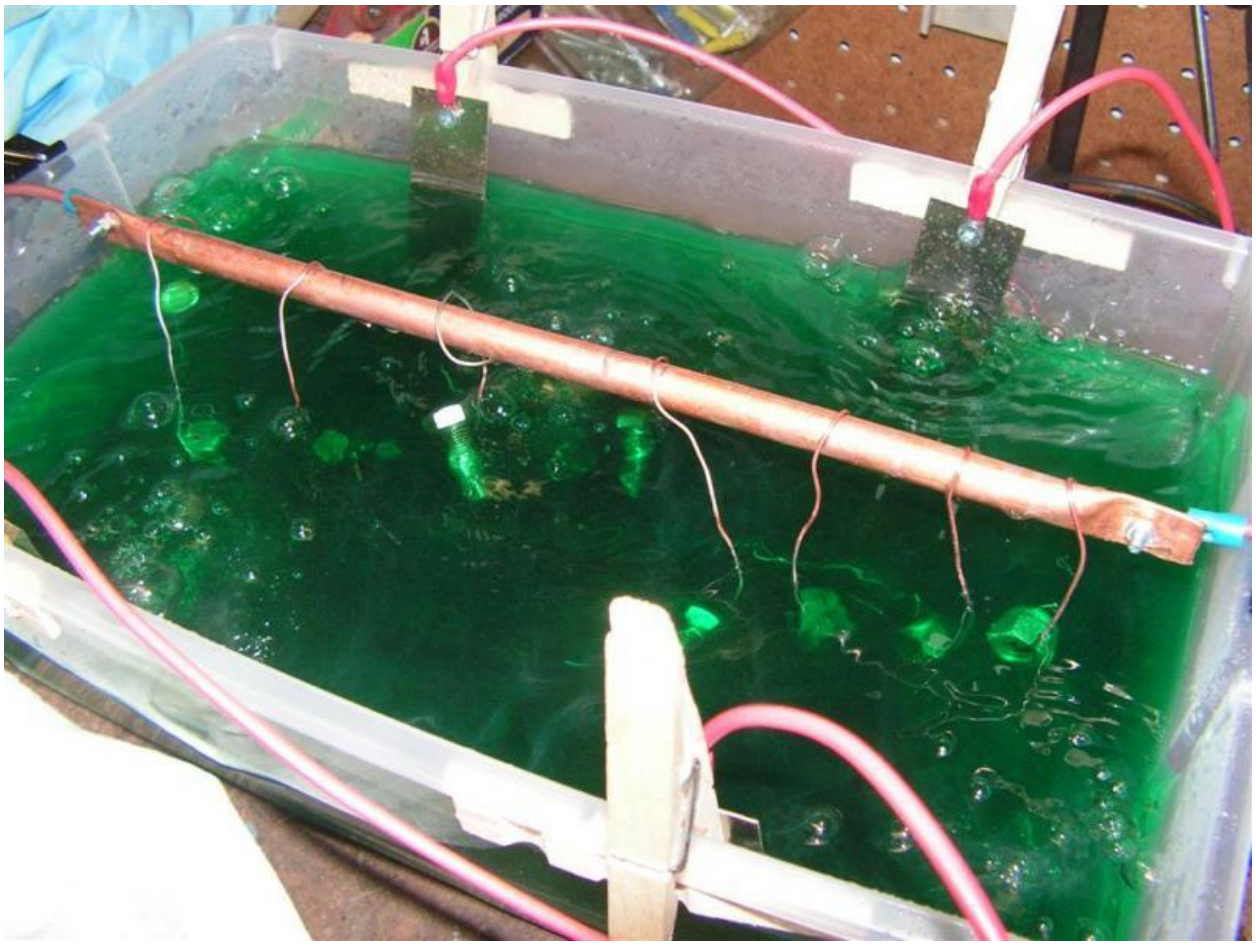
Here I pulled two bolts after 30 seconds and tested some nuts -- they still fit well, so I decided to put them back in the bath and give each part one minute in the solution



IMPORTANT: When you pull the newly plated part from the plating solution, don't just lay it on a towel. **It needs to be immediately rinsed in fresh water** to get the solution off the part. Failure to do this will result in a tarnished looking part within minutes of the plating process.

The results are pretty amazing -- nice nickel finish! Beautiful !!!

All the parts nicely hung up on the negatively charged copper pipe and happily bubbling away -- this took about an hour to do. Prep time was about three hours – LOL



A bench filled with nicely plated hardware ---

I can polish these pieces to a very bright Chrome-like finish, but I prefer a traditional look that reflects the OEM look of the hardware.

The chemicals were purchased through Amazon from a commercial supplier that sells through that site.

http://www.amazon.com/gp/aag/main?ie...=A2QI1LLWJGHHE