Nickel Plating Materials:

• pure nickel
• Pure White Distilled Vinegar (5% acidity)
• rubbing alcohol (isopropyl alcohol)
• table salt
• distilled water
• D-Cell batteries or 6 volt lantern battery
• automotive battery charger or 12v power supply
• wires with alligator clips
• glass jar or cup (this can be plastic but must be heat resistant)
• electronic thermometer
• sandpaper - 80g to 800g
• Dremel or drill
• polishing wheels and compounds
• hot plate (optional)
• automotive block heater (optional)
• automotive car battery warmer (optional)

Where to find some of these materials:
NICKEL - this was the hardest thing to find. **It has to be 90% to 100% pure nickel**. Best to avoid nickel coins as I discovered that here in Canada our 5 cent coins are no longer pure nickel; they are either copper with a nickel plating or steel with a nickel plating. Other sources can be commemorative coins, nickel welding rods, or just a plate of nickel which can be obtain from a metal supply shop. You can test an assumed piece of nickel with a magnet as it is magnetic, however if your metal is nickel plated steel, it will obviously still be magnetic, so just be aware.

Luckily my neighbor had a small ¼" thick plate of nickel that I could use.

Pure White Distilled Vinegar (5% acidity, rubbing alcohol (isopropyl alcohol), table salt, distilled water - These can all be found at your grocery store.

Everything else you likely already have or can be purchased from your local hardware store.

STEP 1: PREPARE YOUR PART

Before you can plate your part, it first has to have most of the original nickel plating removed. There's a way to do this chemically, but I didn't want to mess around with more chemicals that I needed to, and most of my parts were

dinged or dented and needed filing and sanding anyways. Mechanical removal of the old plating was the route I chose to take, and this can be done by sand or bead blasting, using sandpaper, by filing, or whatever method you prefer. Just remember that you'll need to get this part super smooth so that your marks of abrasion don't show up in the plating. I used plain sandpaper for a lot of the parts and this is a nice controlled method of removing the plating without doing too much damage to the base material. WEAR A DUST MASK WHILE SANDING.

Start with a rougher grit, like 80g or 100g, and start sanding away. Work your way up to 600g or 800g to get your part nice and smooth. Now that it's mostly smooth with the nickel removed, it needs to be polished to a shine. Any marks or scratches left in your part WILL be visible after plating, so this is an important step. I used a buffing wheel in my power drill for larger parts, and used little buffing wheels in my Dremel for smaller parts. The red buffing compound I used was called called Jewelers Rouge. Buffing is a task on it's own, and tutorials can be found elsewhere for this, so I won't get into it.

Now that it's all shiny, you need to get it clean. I have automotive parts cleaner called Wax and Grease Remover, but you can use paint thinner or rubbing alcohol. This is to remove any buffing compound that might still be stuck to your part. Your part needs to be super clean, otherwise you'll have splotchy plating results.

STEP 2: MAKING ELECTROLYTE SOLUTION - NICKEL ACETATE

Nickel plating is done by means of electrolysis, so we need an electrolyte solution to submerge our parts into. You can buy nickel sulfate crystals from a chemical shop or online that you mix with distilled water. However I didn't want to wait for a shipment, and I couldn't find the stuff anywhere here in town. This is how you can make the nickel acetate using what you have already.

1. You need a piece of nickel to use as an anode, and another piece to use as a cathode. I only had the one big chunk of nickel, so I cut it in half with a hacksaw (took forever). I drilled a hole in the corner and hung it from a piece of wire. This wire can be anything conductive; I used mechanics wire, which is some easy to bend steel that I first had to clean really well with solvents.

2. Get a clean glass jar or cup (size doesn't matter but find something big enough that has room for you to move your part around inside with room to spare) and hang the two pieces of nickel from opposite sides (see pic). Don't let them touch one another!

3. Pour the white vinegar into the glass jar so that it covers your nickel.

4. Re-position your nickel anode/cathode if the wire it hangs from is touching the vinegar. You DO NOT want the hanging wire to touch the liquid!

5. Now you need DC power. For this I used a DC 12 volt 1 amp laptop power supply. Alternatively you can use a car battery charger set at 10 amps, or a trickle charger will work for this too, but the lower the amps, the longer this process takes. Hook up the positive lead to one of the nickel pieces, and hook up the negative lead to the other piece of nickel. I attached my leads to the steel wire hangers to be sure the leads didn't touch each other.

6. Before you plug in your power, toss a pinch of salt in the vinegar. This will help make the solution more conductive.

7. Plug in your power supply and watch as the negative anode starts to produce bubbles (hydrogen). After 2 hours the solution should become green. If you're getting a different color, this means your nickel source is not pure and you're getting some other metal in the solution.

The idea here is that power is sending ions from your cathode to your anode, essentially dissolving the nickel into the vinegar. The solution will get warm during this process and I found that even a plastic container will hold up fine to the amount of heat it generates. I used a digital thermometer and measured mine to get up to 100F.

How long this process takes depends on your volume, nickel source, and power supply. The best way I found to gauge when the solution is done (saturated) is when little nickel stalagmites start to build up on your nickel source. If these little bits fall off and sink to the bottom of your container, they can be retrieved by using a magnet. This means you're done and can unhook your power supply. You can now either let this nickel acetate cool, or jump into plating.

STEP 3: PLATING

When you're ready, I recommend doing a test with a penny or maybe a brass screw. Best to first get familiar with the plating process using something that isn't an irreplaceable part from your phonograph.

1. To start off, you need to get your electrolyte pretty warm as this helps it to adhere. I was generally in the area of 100F to 125F, and to achieve this I used a hot plate. If you just finished creating your electrolyte, the solution will likely already be pretty warm from that process so if you're prepared you can jump right into plating. If you have an electronic gun-type thermometer, use it to check the temp of the electrolyte.

2. Wear latex or nitrile gloves when handling your metal part. This is to keep it clean of dirt, grease, and your fingerprints. It's also to avoid contact with the electrolyte when removing parts from the jar.

3. You'll need a method of suspending your part in the jar. For light weight parts you can use an alligator clip like I did, but note that the clip will also get plated. You can also use the same mechanics wire that the nickel source is hanging from, or even some household electrical copper wire. Basically you can use anything conductive, but the more obtrusive it is will require you to re-position your part more often. The alligator clips were handy because it held you part and could be attached to your power supply easily.

4. For a power source, you can't use anything that plugs into the wall. Car charger, cell phone charger, trickle charger, laptop power supply, bench top power supply...none of this stuff worked. Anything that uses a transformer to step down 120V AC to DC creates a jittery frequency that will plate your object really fast (and it'll look great) but the plating will flake right off. I tried everything, and the power source that works best is batteries. Initially I used some D-cell batteries, but they took a long time to plate anything and would sometimes become textured (scale-y) or become foggy, which meant a bunch of buffing was required afterwards. **The absolute best power supply you can use for this process is a 6V Lantern Battery.**

5. Connect the positive lead to the positive battery terminal and the other end to your nickel source and place it in the jar. The nickel doesn't have to be completely submerged, nor do you want your positive lead touching the electrolyte as that would introduce a new cathode and whatever metal it is will start plating to your object as well!
Connect the negative lead to the negative battery terminal and the other end to the object you wish to plate. This does need to be completely submerged so that

the nickel can plate all sides of your part. This is now a complete circuit and you are plating! It's working if bubbles start to form on your part.

6. The circuit flows from positive to negative, so the nickel source is going to flow ions to your part. Any obstructions, like your part hanger, will block the nickel from hitting your part, so you will have to move the hanger to expose that area of your part after some time. You will also need to rotate your part as it seems this process is like line-of-sight. Whatever side of your object faces the nickel will plate great, and the backside not so much, so be sure to rotate it often. Try not to remove the object from the electrolyte while you rotate your part as this will break the connection to the circuit and could give you a mixed results. Also, stir the solution as this will swirl some of those ions around your jar to help plate non line-of-sight areas.

7. If it's a small part, it should be done after about 5 minutes. Shorter times will give you a thin plating that won't require buffing because it comes out perfectly shiny. But if you want thicker, more durable plating, then leave the part in for longer. Sometimes I left a part in for 30 minutes (grab a seat, you'll be here a while spinning parts in a jar), but the result is the part will look dull. When you're ready, pull the part out and rinse it off with distilled water to remove all of the electrolyte (I used this in a spray bottle to make it a bit easier). If the part is still hot from the solution, let it cool down before the next step.

8. Test the adhesion of your nickel plating by putting a piece of masking tape on it, and the ripping it off. If bits of nickel come off, then something went awry. Make sure your part is clean, solution is warm, battery is charged, etc.

9. If your part is dull, grab your buffing supplies from earlier and polish it to a shine. Be gentle if you're unsure of the thickness of your plating, as I managed to buff right through it when I was being to aggressive. Generally the plating is pretty strong and should be resilient to your buffing.

10. If you do find some ares didn't plate completely, you can dunk it again to build up the plating. Just start the process over again starting with cleaning it thoroughly.

11. That's it, you're done! If you plan on keeping your electrolyte for future use, let it cool down and then put it in a sealed container with a label.