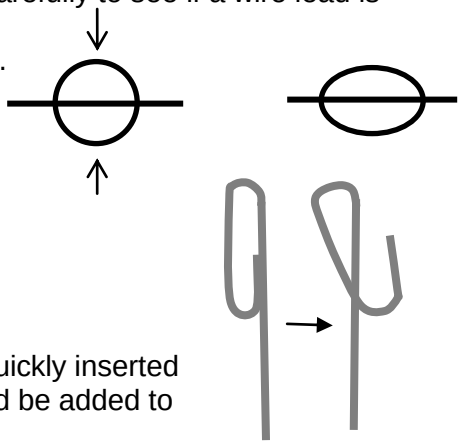
SIMPLE MOTOR - Troubleshooting Tips

The why of Troubleshooting:
The fact that something does not function as desired should be looked at as a chance to learn something new or as a mystery to solve, not a failure to avoid. A single failure can provide a richer learning experience than a string of successes, although it is nice to finally succeed! What elements must be in place for the device to operate (such as battery, periodic conductive path, magnet, smoothly pivoting coil).

Coming up with possible reasons, hypotheses, for an element to fail (is there "gas in the tank"?) and then designing methods to test and eliminate each in turn creates excellent problem solving practice. Observational skills are a key part of troubleshooting. Small details or changes can be important to seeing what to preventing successful functioning. Another key is the trial and error approach to troubleshooting as observations are made after elements are modified or added. Partial success or improvements may point the way to a final result. A key element missing in many learning settings are situations that build persistence or "grit". Incorporating the fact that repeated efforts after a string of unsuccessful attempts may be required before success is achieved is a life skill that needs to be learned. Troubleshooting involves Next Generation Science Standards – Science and Engineering Practices:
Practice 1 - Asking Questions and Defining Problems;
Practice 3 - Planning and Carrying Out Investigations;
Practice 6 - Constructing Explanations and Designing Solutions

General suggestions:

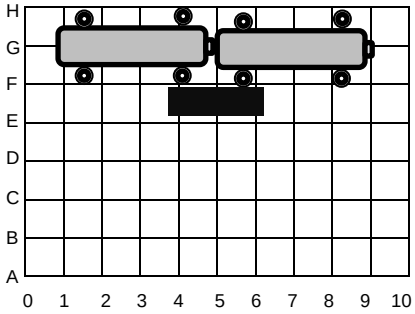
1. Try spinning coil in the opposite direction
2. Slightly twist the paperclips to touch different spots on the toothpick
3. Lightly rub sand paper along the straight and spiral wires on the toothpick to make sure there is a good contact.
4. Slide the straight wire around the toothpick to adjust its position. Test and adjust, as needed.
5. Compare a nonworking rotor with a working rotor. What are the differences? How can the nonworking rotor be made to look more like the working rotor?
6. Insert a card section between the end of the battery and the fastener (or remove the battery). Next insert the coil into the paperclips and slowly rotate the coil and watch carefully to see if a wire lead is binding/hanging up with the paperclip.
7. Slightly press on the coil as shown to flatten the coil into an oval shape. Doing so will allow the coil to spin more easily, taking less energy
8. Check the battery and connections by placing a 1.5 to 2.5 volt bulb between the paperclips. (Note that very rarely an alligator clip will have a hidden broken connection at the clip.)



Creating a test station for rotors:

Bend the paperclips by pulling the smaller loop past the long straight leg of the "9" shape, as shown.

This will allow difference rotors, or variations of the same rotor, to be quickly inserted and removed in for testing. In addition a second battery, in series, could be added to double the voltage to power the coil, see suggested layout below.



Simple Motor - http://www.raft.net/ideas/Simple Motor.pdf