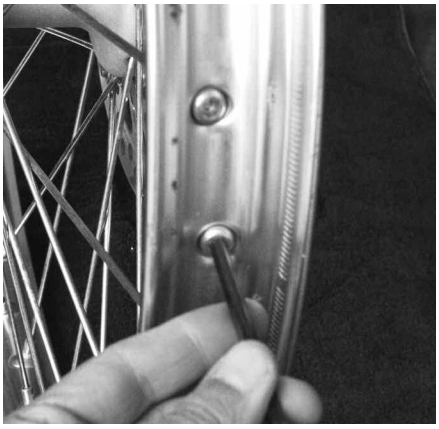




Left: A perfect fit between spoke wrench and nipple makes the job easy and…(Center) prevents this from happening. Not only is this nipple rounded, it's also become crushed against the spoke threads, making it doubly difficult to remove. Right: Once loosened "topside" with a wrench, nipples can be unscrewed easily from the other side.

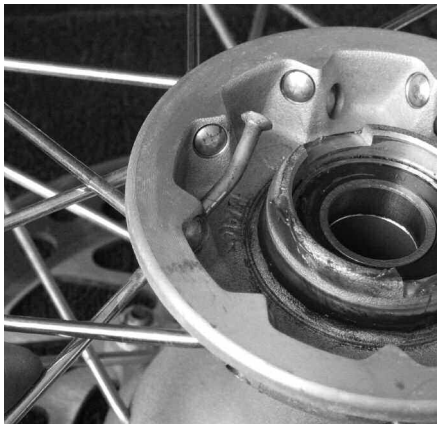
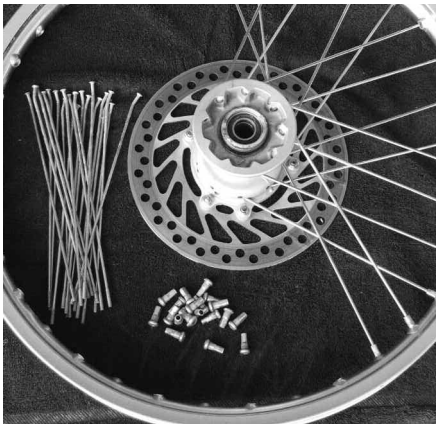
sets may require special measures, such as setting the rim on a couple two-by-fours in order to get its centerline at the midpoint between the two hub flanges. You'll be lacing one hub flange completely before turning everything over. Thread the first spoke through its hole in the hub, and then insert its threaded end into the rim, taking care to chose a hole angled upward (toward the side of the hub you're currently working on). If you're working on a very fancy wheel, the rim for which has holes cut at more than two angles (left and right), you'll need to make sure that the spoke's entry angle matches the rim hole's angle precisely. (You can check this by simply inserting a pencil through the hole and confirming that the spoke lines up with it.) Now, after putting a drop of lubricant on the threads to inhibit corrosion, screw a nipple onto the spoke tip—but only a couple turns. This keeps the spoke from falling back out of the rim, but leaves you maximum room to push the rim away from the hub in other directions to give subsequent spokes the clearance they need for easy insertion.

On the wheel shown, we found it worked best to do all the outer spokes (those furthest from the axial centerline) first, and then insert the inner ones. This may be different on your wheel, depending upon the spoke pattern and clearances. You may have discerned the easiest sequence during the disassembly process, or you may have to do some trial-and-error testing at this stage. The main point here is that you should not have to struggle to get all the spokes in place. If you find yourself tempted to force a spoke into position by bowing it or its neighbor, there's almost certainly a better way. Remove a few and try a different order. Be sure to leave the correct number of holes on the wheel open between spokes as you insert them.

Once all the spokes are in place on one hub flange, turn the wheel over and repeat the process on the other side, and when you complete this phase of the job, give yourself a pat on the back; the (relatively) hard part is over. You now have a floppy, jangly thing with a roughly circular shape that will soon become an amazingly sturdy and geometrically precise piece of hardware.

Circular Logic

Chances are, the rim you're working with is currently very close to perfectly round. Your job is to keep it that way while tightening all those spokes, any one of which is capable of distorting your rim's shape in either of two dimensions. You see, spokes are incredibly strong devices. Their real strength is in the form of pulling (tension), rather than pushing (compression), even though that may run contrary to intuition. Spokes do not support the hub from underneath so much as suspend it from above. Think about it. Which would be stronger, a single spoke extending from the hub downward to the rim, or that same spoke extending upward? Would it be easier to bend the spoke below or tear the spoke above? Now it's obvious, right? Tremendous tension can be brought to bear on the rim by tightening spokes, enough to deform a very strong loop of steel or alloy into a wobbly potato chip shape. You can avoid this painfully embarrassing fate if you heed our advice.

Left: Notice how the inner row of spokes on the far flange point clockwise, while the outer row points counter-clockwise. Also, see how their heads are recessed in the near side of this hub. Center: The partially installed spoke illustrates its specific features: The "head," "throat length" (distance it passes through the flange) and "angle" to match the direction to the rim. Right: The old wheel, half-way disassembled.