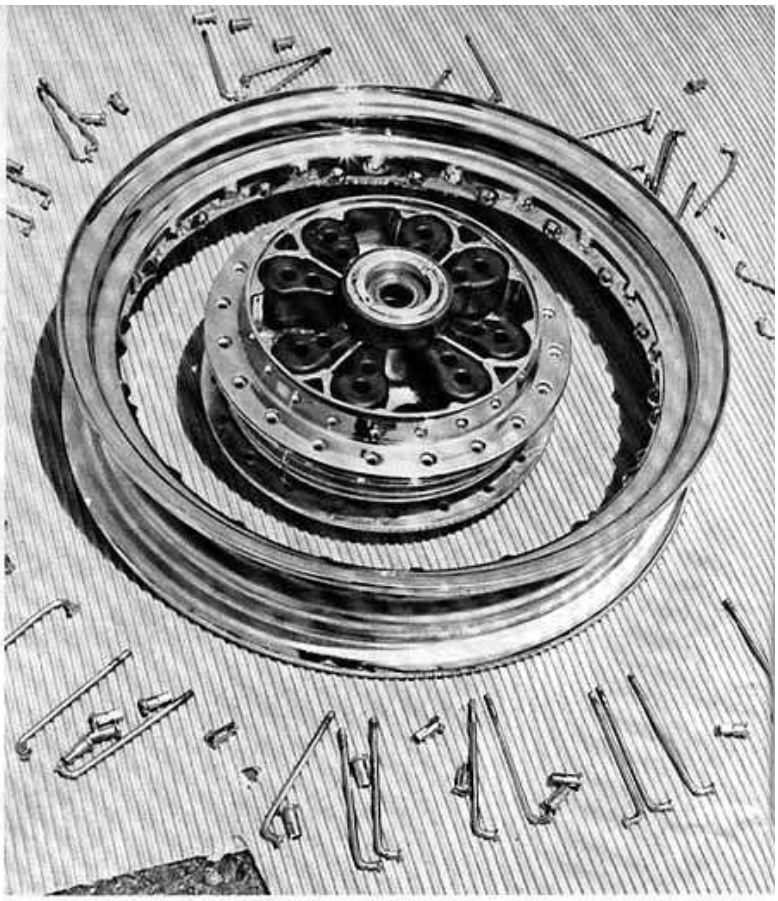
LACING A HUB



All the pieces necessary to make up a rear wheel. Job should begin with layout like this so that parts can be sorted and accounted for. Rim valve hole should be on the same side of hub as brake drum.

■ The wire wheel was perfected not quite 100 years ago by bicycle makers and was popular off and on for automobiles, but it has been the mainstay for motorcycles up until the present day and appears to be for the foreseeable future. Until the mushrooming interest in choppers and customs (and the resurgence of interest in bicycles) during the last few years, it looked as if *lacing*, as the assembly of a wire wheel is called, was on the verge of becoming a lost art. The wheel specialist shops that kept the art alive did so by passing the knowhow down from journeyman to apprentice. But the average home builder who wanted to do the work himself and save a few bucks was out in the cold.

The majority of us would still be out in the cold if we had to go about lacing wheels in the traditional manner which called for starting with blank spokes, cutting them to the proper length, and threading and bending them to suit the job at hand. But thanks to the leading custom houses, kits are available with spokes already cut to length, bent and threaded to lace a specific hub to a specific rim.

When we decided to do an article on wheel lacing, we picked as an example what has been very popular – almost standard, in fact – on choppers: lacing a 16-inch rim to a rear hub to take a 5.00-16 or 5.10-16 tire. We specifically picked a Honda 750 hub, but as we were to learn when we got deeper into the project, it could have been just about any combination because the basic principles are the same.

Next, we journeyed to A.E.E. CHOPPERS, Inc., to take advantage of their knowhow and showhow when it comes to wheel lacing. (A-double-E is a large manufacturer of custom and chopper parts where you can get everything from a foot peg to a kit bike, including paint, molding materials and tools, and electrical wiring and related components. You name it; they've got it.) When we stated our business, the folks at A.E.E. handed us a copy of *The Custom Motorcycle Guide* for our perusal and help in picking out the required parts for our project. And before we get into it, we'd like to say a word about this remarkable publication. The first 80-odd pages are crammed with informative articles of a how-to and technical nature and about 15 chopper features, some in living color. The back of the 180-page book is an illustrated, indexed catalog of A.E.E. parts with prices. We would count this book a "must" on anyone's list who intends to build or customize a bike, and worth every nickel of the $1.95 it costs just in reading value alone. Send the money to: A.E.E. CHOPPERS, Inc., Dept. MCWSC, 730 Monroe Way, Placentia, California 92670, for your copy.

The Honda 750 hub, like most rear hubs, has 40 holes in it, so we specified an A.E.E. part number H-56, which is a 40-hole, 16-inch super wide rim. We then went down the list of spoke sets until we found "Honda 750 hub to 16-inch wide rim," which was part number G-158, for the proper set of 40 spokes to lace the two together.

The A.E.E. development technician started the job by laying the rim, hub,

spokes and nipples (as the special threaded nuts for the spokes are called) out on a clean piece of cardboard to protect the chrome finish. He then separated the spokes into two groups of 20 according to whether they were short throw or long throw, throw being the length from the bend to the spoke head. He then took a short-throw spoke and inserted through a hole in the hub in such a manner that the head of the spoke was left showing on the *outside* of the hub flange. Repeating this operation, he inserted a spoke in every other hole until 10 spokes had been installed, after which he flipped the hub over and did the same on the other side, being careful to pick a hole directly opposite a spoke that was inserted on the opposite side of the hub to start.

Next, the hub assembly with 20 short-throw spokes installed was placed in the center of the 16-inch rim, checking to make sure the valve stem hole was on the same side as the brake shoe part of the hub. Taking one of the upper 10 spokes (the ones nearest him), he then inserted the threaded end into one of the holes in the upper row in the rim. He then counted over *four* holes in the rim and likewise inserted the adjacent spoke. The spokes were retained in place by loosely screwing the nipples on them so that a couple of threads showed. He continued around the rim in a like manner until the 10 upper spokes had been inserted.

Then, without flipping the wheel over, he took one of the lower spokes and pointing in the opposite direction of the 10 spokes just laced, inserted it in one of the rim holes in the lower row. He then counted over four holes etc. until the lower spokes were laced. When these 20 spokes, referred to as *inner* spokes because they lie inside the hub flanges, are laced properly, each upper spoke will form an X with the one directly below it when viewed from above.

That took care of the inner spokes, and then he commenced on the *outers* by taking one of the long-throw spokes and inserting it into the hub so that the head of the spoke was on the inside of the flange. Then laying this spoke in the same direction as the *inner* spoke on the *opposite* side of the hub, he inserted it into the rim. In this particular case this spoke crossed over one inner spoke, which is why this is called "Cross 1" lacing. (Other types of rims may call for Cross 2 or Cross 4 lacing.) Nine more spokes were installed in the same

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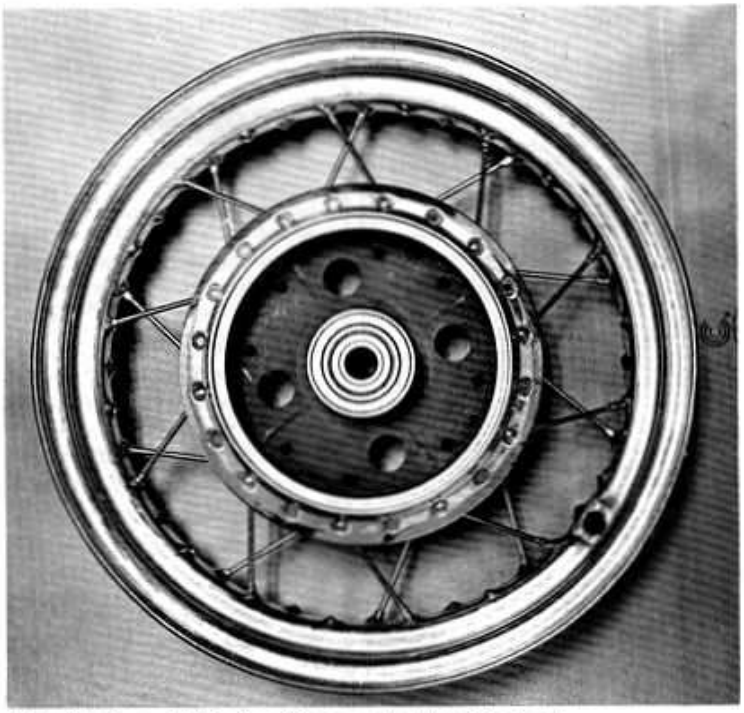
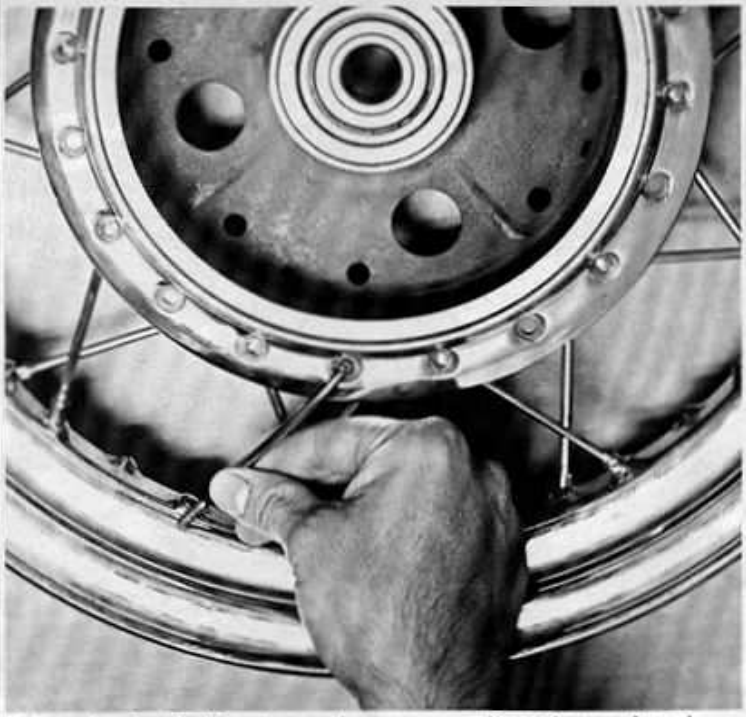
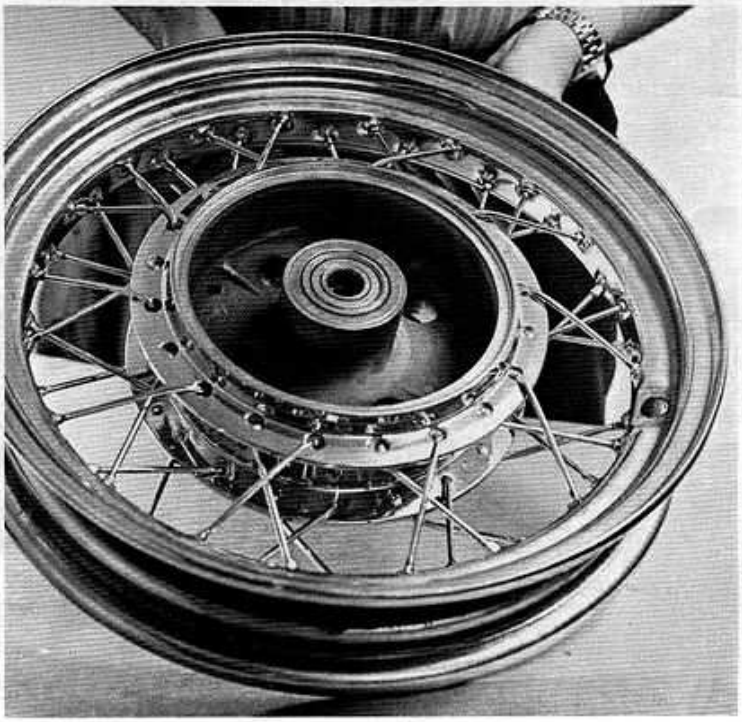
Fatter rear tire (5.10-16 Uniroyal shown) improves appearance, gives better ride and improved traction.



First phase is completed when 20 inner spokes have been laced loosely as shown here.



Outer spokes, installed after inner spokes, cross over adjacent inner spoke and line up with holes in rim.



Lacing has been completed with all 40 spokes loosely installed and ready for final tightening and truing.

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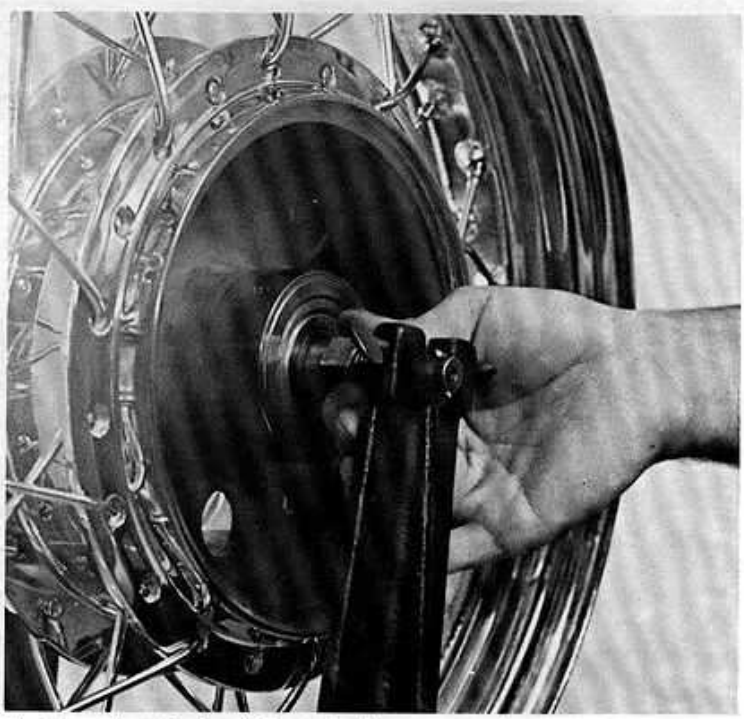
fashion, then the wheel flipped over and the remaining 10 spokes installed in a similar manner. The wheel now looked like a wheel with all 40 spokes held loosely in place with a couple of threads showing through the nipples, but the job was far from done.

Next came *truing*, a process of tightening the spoke nipples so that the wheel runs "true" without wobble or eccentricity. The tools required are a flat-tip screwdriver and a spoke wrench (an ignition wrench or small adjustable wrench will suffice). Also highly desirable is a truing stand and a dial indicator or pointer something like the one shown in the accompanying photos. The homebuilder might want to build a temporary stand, or he can actually use the rear of his frame in place of the stand. The idea is that the hub must be sturdily mounted and free to rotate on its bearings with the arms of the stand (or the rear fork arms) serving as a reference from which to take measurements and check wobble and eccentricity.

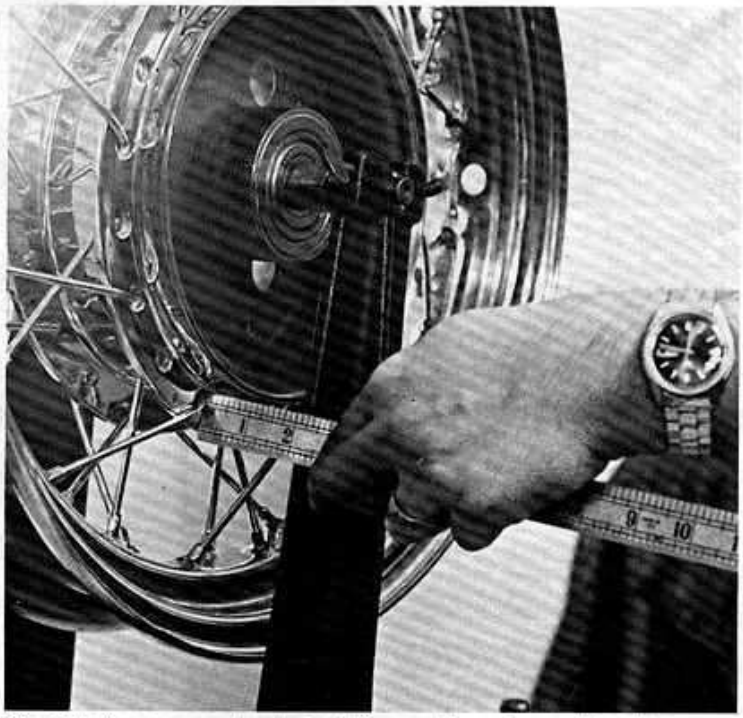
Before mounting the wheel on the truing stand, the A.E.E. man snugged the nipples down, starting at the valve hole for a reference point and working on the inner spokes first and being careful to keep the number of spoke threads exposed equal. Then he did the same thing with the outers. Next, the rear axle was installed and the whole assembly mounted on the truing stand. (Some truing stands use conical centers that pick up the bearings directly without using the axle.)

Centering the rim on the hub *in the plane of the wheel* was attacked first. Rim width was measured across the flanges, which turned out to be 4-1/8 inches in our case. Then the distance across the spoke flanges of the hub was measured and found to be 2-3/8 inches. The difference between the two dimensions was found by subtracting the smaller from the larger and came to 1-3/4 inches. This was then halved, and the 7/8-inch result jotted down for reference.

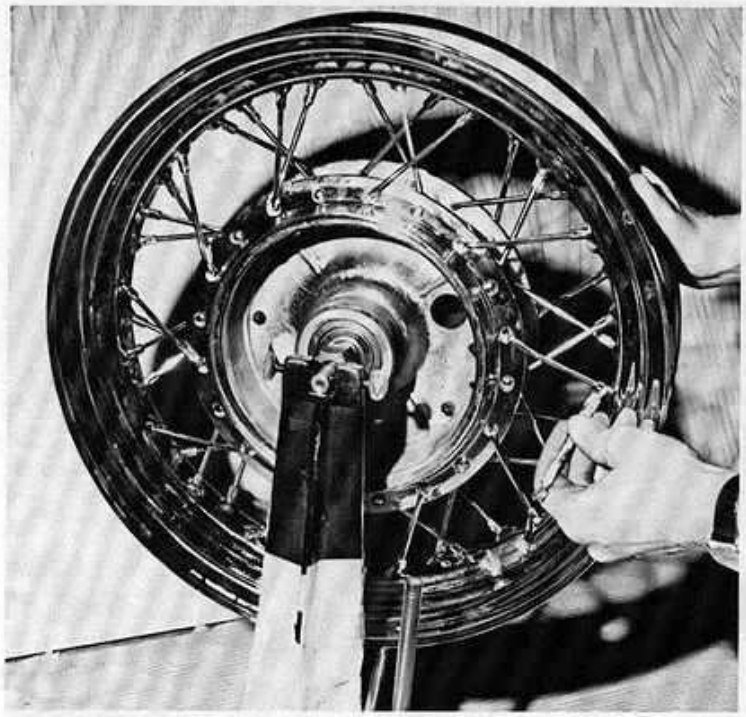
One leg of the truing stand, referred to as the *jig*, is made so that it is parallel with the plane of the hub spoke flange when the wheel assembly is clamped in place and serves as a reference from which to take measurements for the purpose of truing. (When doing this with the wheel installed in the frame, a straightedge can be clamped to the frame parallel to the spoke flange for the same purpose.) The distance from



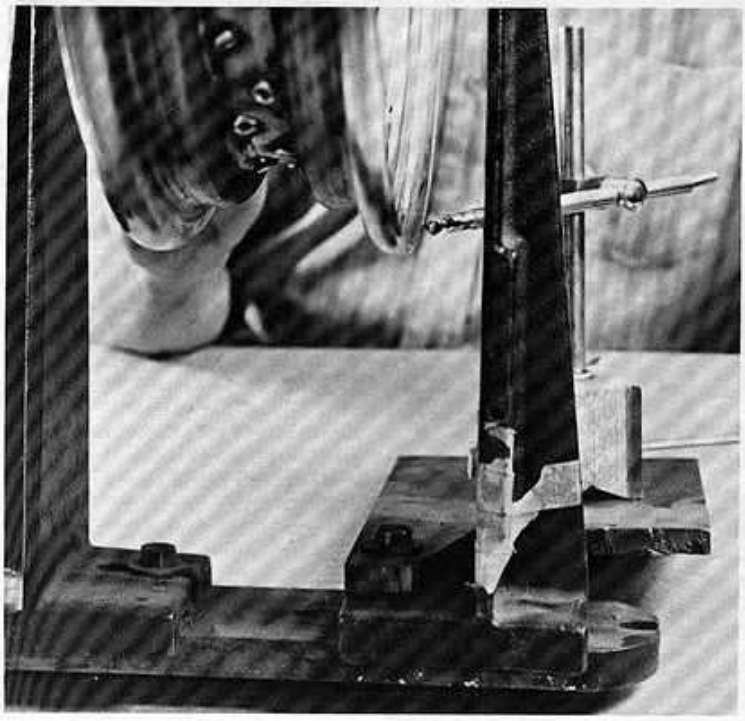
Wheel must be snugly installed on truing jig to prevent relative movement.



Certain basic measurements and calculations must be made as explained in text preliminary to truing. Spoke flange to jig distance is being measured here.



Final tightening of nipples is done with spoke wrench, but small adjustable or ignition wrench will do in a pinch.



Pointer is set up to check wobble; it is also relocated to check for up and down movement indicating eccentricity.

the hub flange was measured and found to be 2 inches. The 7/8-inch figure we saved for reference was subtracted from that, which gave an answer of 1-1/8 inches. This means that the distance between the jig and a properly centered rim flange will be 1-1/8 inches at all points around the circumference.

Next, the wheel was rotated until a spot was located on the rim that was exactly 1-1/8 inches from the jig, which was then marked with pencil on masking tape.

A spring-loaded pointer was then set up with the tip near the marked spot. (A dial indicator or piece of steel wire would have also served the same purpose.) Then the A.E.E. technician began carefully tightening the nipples a couple of turns each, again starting at the valve stem hole for reference. As he went he explained that the rim is pulled from side to side primarily by the outer spokes and up and down primarily by the inners. As he went around the rim he would tighten (or loosen) nipples so that *both* the pointer-to-rim distance was equal all around and the jig-to-rim (1-1/8 inches) distance remained correct. He would then relocate the pointer to check the up and down movement (eccentricity) as the wheel was rotated, adjust it with the nipples, then go back and check wobble and centering.

After checking back and forth around the entire circumference until every little error could be detected with the pointer, he checked with a dial indicator and found no error gave a total reading more than .010-inch, which is plenty good enough. He then made one last check to see if he'd missed tightening any nipples. The final step in the job consisted of grinding flush the ends of any spokes that protruded through the nipples to prevent them from puncturing the tube.

Depending on what you're lacing to what, the actual lacing may vary somewhat such as the number of spokes crossed over and the number of holes between inners on the same side etc., but the sequence is always the same. The A.E.E. people suggest, especially on your first time around on a given hub/rim combination, that if possible, borrow a properly laced wheel like the one you're building to use as a model and avoid possible confusion.

Lacing is a challenge at first, but becomes a snap after you get the hang of it. It's a valuable trick to have in your bag and one almost certain to put you one up on the next dude that putt-putts by. ●