

Drill-Chuck Reconditioning

Overhaul cures lockjaw

by Richard B. Walker

Binding, sticking, hard-to-operate drill chucks rank high on most woodworkers' pet-peeve list. Yet few of us do anything about them. A hoary myth is floating around that balky chucks can't be repaired. And since new ones aren't cheap (name-brand half-inchers are nudging \$45 these days), most of us opt to struggle along with the same old cantankerous chuck year after year.

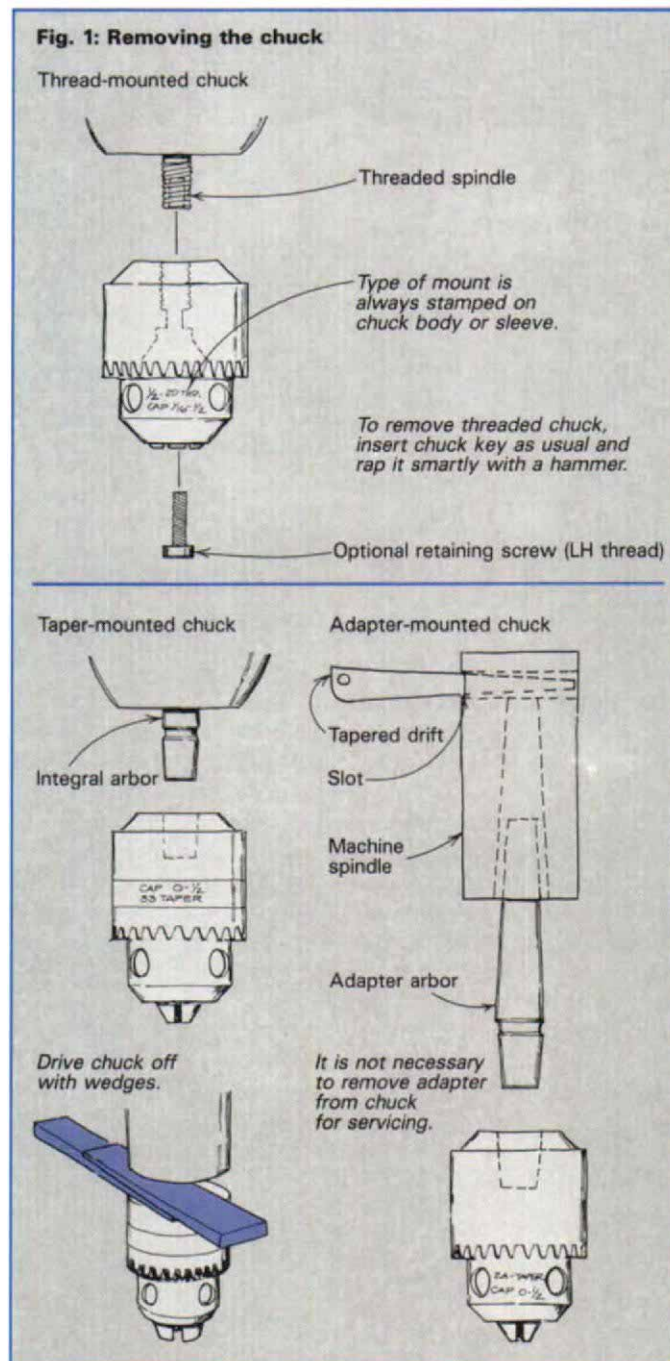
But the truth is, chucks can be readily field-stripped for servicing. Knowing how is the key. Like interlocking Oriental wooden block puzzles, a chuck's disassembly procedure is not immediately apparent. But once you find out how to get one apart, chances are excellent that just cleaning, deburring and lubricating will cure its problems. And, should any components turn out to be worn, replacement jaws, nuts and sleeves are available for most name-brand chuck models. Even a badly worn chuck can be totally rebuilt to like-new condition for roughly half the price of a new one.

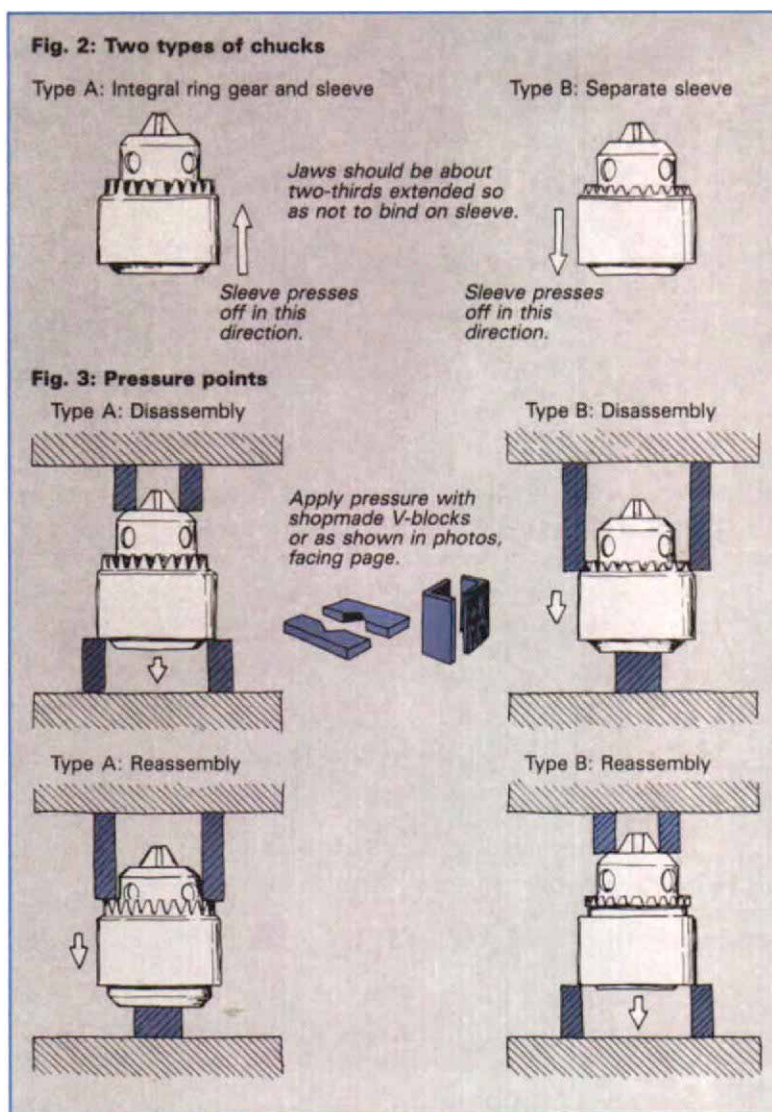
I'd advise doing one thing before commencing any overhaul. Carefully inspect the gripping surface of the jaws. If the jaws are badly flattened, scored or unevenly worn, you'll probably need new ones. If that's the case, check to see if replacement jaws are available for that particular brand and model of chuck. If not, it makes no sense to do an overhaul, and you might as well resign yourself to buying a new chuck.

- **Removing the chuck**—Thread-mounted chucks are used on portable tools and a few drill presses. Taper-mounted chucks are standard on the majority of drill presses, mounted either directly onto the machine spindle or via an intermediary adapter arbor, as shown in figure 1.

Usually you can remove taper-mounted chucks with wedges or a drift as shown, but if in doubt, consult your owners' manual for directions. For thread-mounted chucks, first open the jaws completely and check inside for a retaining screw. All reversing drills plus a few fixed-rotation models use them. Take care in selecting the proper size screwdriver to avoid damaging the slot. . . which could preclude ever removing the chuck. Retaining screws are always left-hand thread, so remember to turn *clockwise* for loosening. Sometimes factories apply a dab of thread-locking compound, and cracking it loose takes some force.

Disassembly—Almost all key-operated chucks fall into one of two families. Each type requires a different disassembly procedure, as shown in figure 2 on the next page. Determine which type you have by inspecting the sleeve area immediately behind the ring gear. Separate sleeve-and-ring gear models (the B type)





In the type A chuck (most Jacobs chucks are type A), the ring gear is part of the outer sleeve. A separate split nut works the jaws. Note that it's not necessary to remove a tapered spindle adapter to disassemble a chuck.



In the type B chuck, the ring gear is part of the split nut that works the jaws. Pressure must be directed against the narrow outer edge of the sleeve, not against the ring gear, to slide the sleeve off.

show a faint joint. Integral sleeve-and-ring gear units (the A type) have no demarcation line. Except for their economy consumer line (which is just about impossible to get apart without destroying the sleeve), Jacobs brand chucks are all A type, Supreme brand ones type B. Up until about 15 years ago, most chucks were made by these two companies. The recent flood of imports has changed this. And they're as apt to copy one type as the other, so you really have to check carefully. If you get it wrong, not only will your chuck fail to press apart, but you run the risk of damaging it as well. Both types are shown disassembled in the photos above.

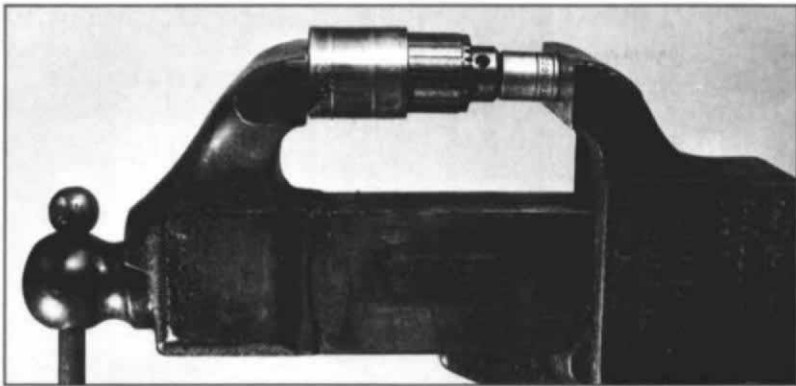
Typical medium-size shop vises can press apart most $\frac{1}{4}$ -in. and $\frac{3}{8}$ -in. capacity chucks plus some $\frac{1}{2}$ -in. ones. In the case of a really stubborn fit, you can resort to a gear puller or an arbor press. If you can't talk your corner gas station owner into letting you use his, most auto parts stores will rent pullers or the use of their bearing press for a few dollars.

Pounding the chuck apart isn't usually recommended because it may damage the sleeve or the body. But on a chuck that's in marginal condition, it may be the way to go. Choose a thick concrete slab or large block of timber as your base. Wield a heavy hammer. Scraps of aluminum or brass are preferred over steel for use as bushings/spacer blocks because they won't cause damage.

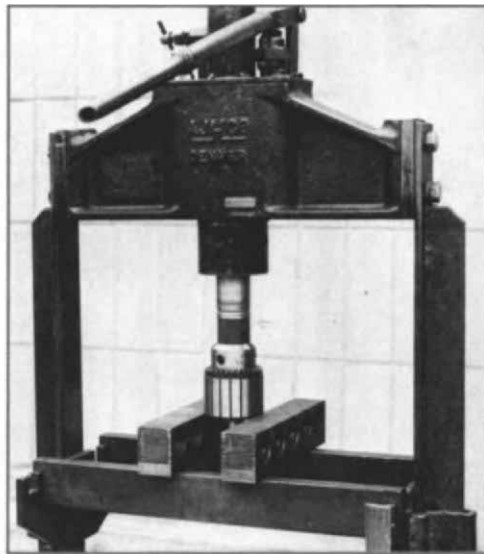
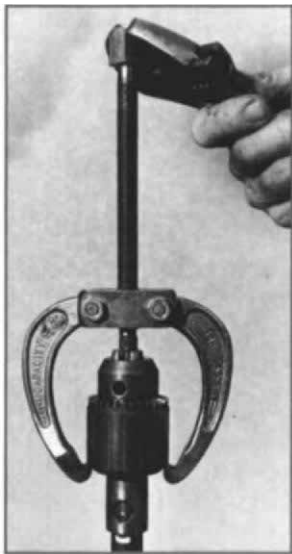
Quite often the hardest part of an overhaul is finding the appropriate-size metal bushings for pressing the sleeve off or on. Various sockets from U.S. or metric socket sets usually will work on up to $\frac{1}{2}$ -in. capacity chucks. For larger chucks, metal spacer blocks can be substituted. Positioning becomes more tricky, however, especially when you're using a vise. A pair of straight bars will serve, but V-type spacer blocks work a little better, providing four points of contact instead of two. You can easily make homemade V-blocks by hacksawing them from scraps of $\frac{3}{8}$ -in. to $\frac{1}{2}$ -in. thick steel plate or flat stock. Thick aluminum will also work (you can saw it on the bandsaw), but it will get quickly chewed up if you overhaul more than just a few chucks. Or you can saw two short, equal-length segments from an appropriate-size length of angle iron and use them upended.

Before pressing, close the chuck jaws about two-thirds. When they're open too far, they project into the path of the sleeve as it slides off, and damage can result.

Since you wouldn't be disassembling your chuck if it wasn't sticking, the jaws probably will be quite stiff to slide out of their channels. Try rotating them off-center a little while pushing and pulling. If that fails, pry them free, one notch at a time, using an old screwdriver as a lever. Jaws are keyed to their particular channels, so mark each as you remove it. Using the sharp edge



Three setups for disassembling a type A chuck: For small to medium chucks, a vise can often do the job as shown above, using SAE or metric sockets as bushings. For stubborn chucks, a gear puller usually works (below left). Note that it bears against a bolt placed in the partly open chuck, not against the chuck's jaws. Really stubborn cases may require a hydraulic press, a tool your local gas station may let you use.



Burrs, which cause the jaws to bind, can form at sharp edges inside the chuck. Typical trouble spots are shown by arrows in the photo above. To remove existing burrs and help prevent reoccurrence, chamfer such edges with a knife, round needle file or stone.

of a grinding wheel, I slightly nick the jaw tops once, twice, three times, respectively, and scribe corresponding lines on the chuck body.

Reconditioning—An old toothbrush and small wire brush will clean away any old lubricant or dirt from chuck components. If the grease has congealed and is stubborn, soak the parts in a pan of solvent and try the brushes again.

Now assess if replacement parts are required. Check the nut threads, jaw threads, jaw gripping surfaces and ring-gear teeth. Except in cases of severe abuse or extreme usage, these parts are usually quite durable, at least in name-brand chucks. But, some imports are a different story.

Most sticking and hard-operation problems are caused by internal foreign matter or burrs on the chuck body. Especially susceptible to burrs are the areas receiving thrust loads from the nut, and the jaw-cavity areas near the tip of the body, as shown in the photo above right. Some chuck bodies are hardened steel, and you will have to use slipstones to remove burrs. On unhardened bodies, you can use round files or even chamfer sharp edges with a knife. Work on rough areas until you have all the jaws sliding smoothly throughout their normal operating range, but don't change the overall size and shape of the channels.

Reassembly—Lubricate the components sparingly with oil or, better, a light grease. Oil will allow you to quickly spin the chuck open and closed, but grease gives a more solid feel to its operation and lasts far longer.

Position the jaws so all project the same distance, then replace the split nut. You can now manually turn the nut to check the chuck's operation throughout its entire range. As with disassembly, remember again to close the jaws about two-thirds. Double-check to make sure all jaws are projecting the same amount (it's easy to get one a notch out of place), and press the sleeve back on. The trick is to initially slide the sleeve over a *vertical* chuck body, thus ensuring the split nut remains in its proper position. Should anything bind or not feel right, press the sleeve off and start over again. Also take care that you're pressing straight and not slightly cocked.

When reinstalling taper-mounted chucks on spindles or adapters, clean both mating surfaces and always assemble dry—never use grease or oil.

Finish off your reconditioning job by purchasing a new chuck key. Chances are you could use one, and you've earned it. □

Richard B. Walker is an Irvine, Calif., citrus grower who writes about metalworking and also makes guitars. Photos by the author.