TECHNICAL FEATURE

The Baby Wheel

Home Grown and Handy

BY BUDD DAVISSON

If you hang around Jim Younkin and Historic Aviation at Springdale, Arkansas for any length of time you get an entirely new perspective on building and restoring aircraft. Most of this is because of Younkin's unique background in manufacturing which drives him to find increasingly efficient ways of doing things.

It is nearly impossible to explain to anyone who hasn't been there how quickly he and his people do things. For instance, in the four weeks between two of our visits, he went from testing his wing jigs by putting spars in them for the first time, to building three complete sets of Mullicoupe wings minus the flaps and ailerons.

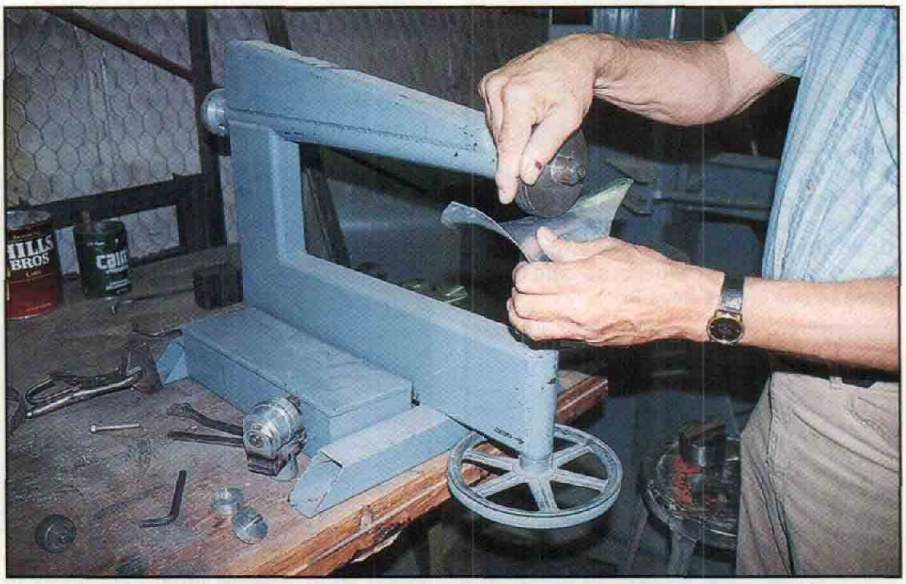
Turn your back for a second and he's come up with a new method to do something and leap frogged ahead.

His shop is loaded with neat gadgets which have come out of his quest for efficiency and one of the very neatest is a baby English wheel which allows him to make fairings and smooth smaller parts which won't easily fit in the big English wheel.

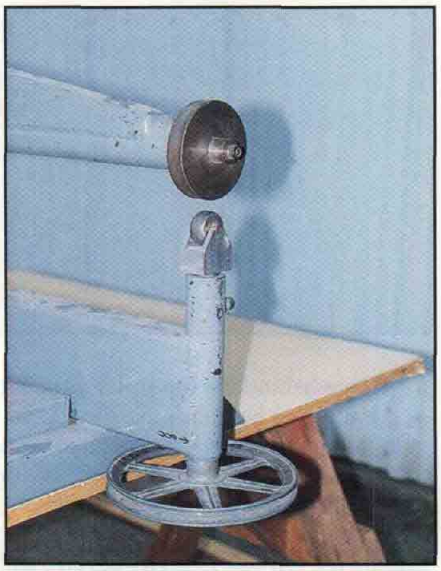
What attracted us to the baby wheel is that it is something any one of us could make in our shop. The lathe work and minor milling operations could be farmed out and wouldn't take more than a few hours at any competent machine shop.

If absolutely necessary the basic frame could be made with no machining at all. The hardest parts to find would probably be the rectangular tubing which is approximately 1-1/2" by 6". Less than three feet is needed and there is a good possibility it could be found as a cut-off at a commercial construction site. A lot of commercial buildings use this exact type of mild steel tubing for framing.

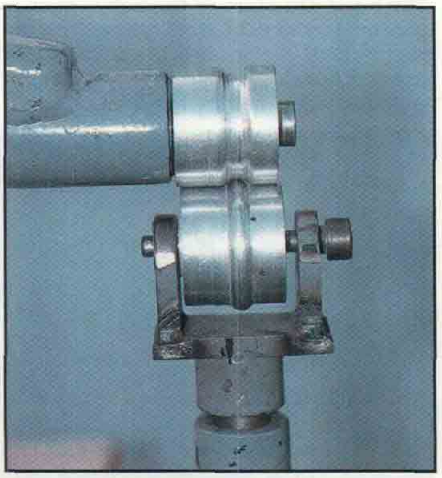
Younkin wanted to keep the end of



Using the baby wheel differs from the large one in that the upper wheel is driven by the operator's free hand rather than trying to push the work piece through the rollers. If working on a larger piece it can be pushed, but it isn't necessary. The small size of the rollers lets the little wheel work in really small radii, but there's nothing stopping a homebuilder from substituting larger rollers for larger work.

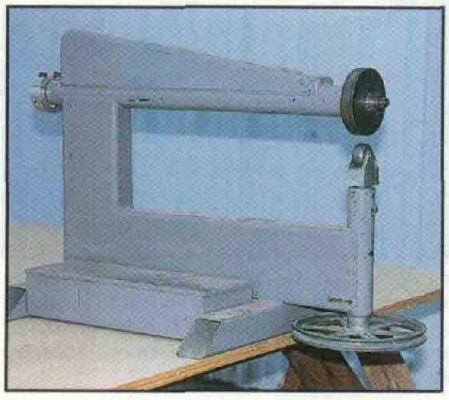


The vertical stem contains a threaded rod with a shoulder on it that pushes a piece of bar stock up which, in turn, forces the bottom roller up against the top one.

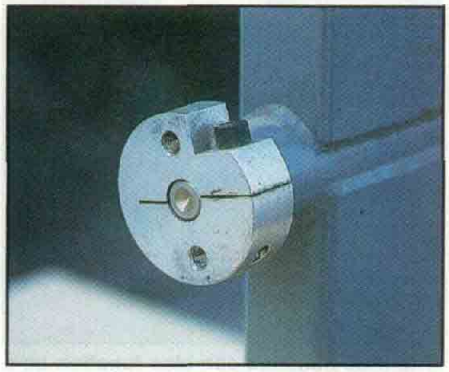


The little machine can also function as a beading roller by simply making a set of appropriate rolling dies. This has a lot of applications but Younkin reports he uses this mostly in rolling beads in gas tanks on either side of the baffle locations before welding the baffles in place. This prevents heat distortion and makes it easier to weld.

When in beading mode, a crank is mounted on the flange at the other end of the main shaft. Turning the crank turns the top bead die which pulls the metal through. It works so slick you have to see it to believe it!



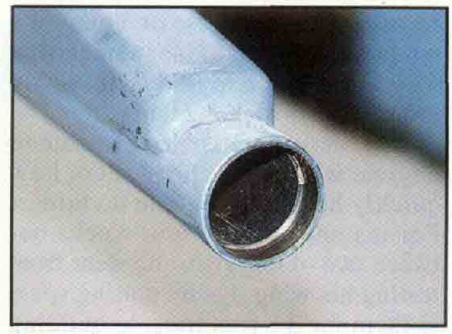
The basic structure of the baby wheel is garden variety mild steel tubing. The big rectangular pieces are the same thing used in building construction. It can be welded by any method available.



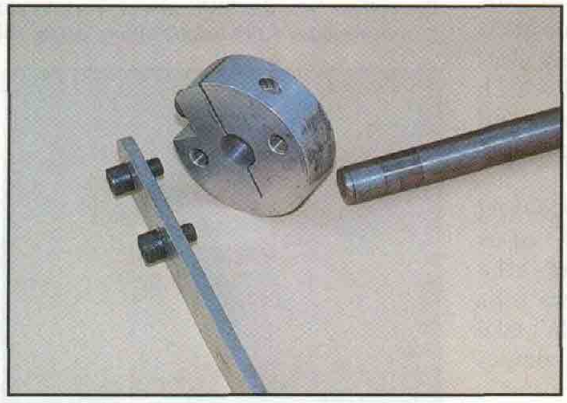
The crank mount doubles as the retainer for the main shaft. The material can be anything hard enough to handle the threading operations. Jim obviously likes to do everything in the most professional manner, but here too the homebuilder could do the entire operation in a drill press and leave the block square.

There are no ends to the types of beading and flanging operations that can be done on the machine. This is made especially easy because the rollers can be made out of 2024 T-6 which makes turning them out on a lathe no work at all. The "U" shaped, main roller carrier, upper left, can be milled or sawed to shape. The roller shaft hole is more than 180° so the shaft snaps in place.

The main shaft rides in two ball bearings which sit in shallow lathe cuts made in the main tube. Wall thickness is approximately 1/4".



Although turning the shoulders in a lathe is the preferred method, an enterprising builder without a lathe could probably form the shoulders by finding a tube with the right I.D. to accept the bearing then slide a collar in and braze it in position.

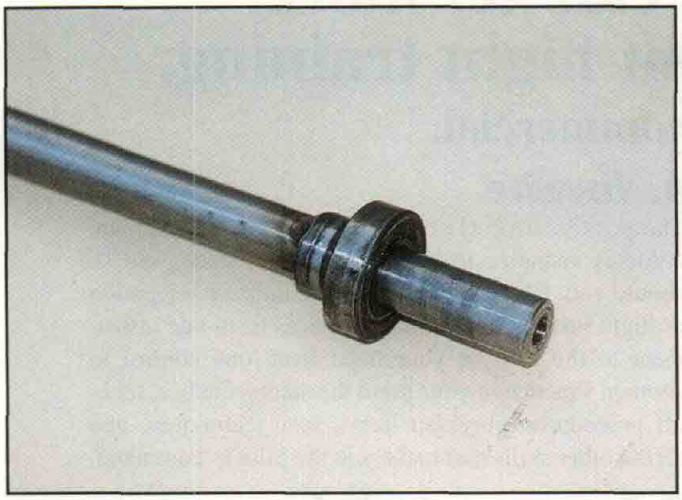


The main shaft should be a piece of hardened steel rod although any high carbon alloy like 4130 would probably work just as well. A hole has to be drilled and tapped in the end for the roller retaining bolt so it shouldn't be too hard.

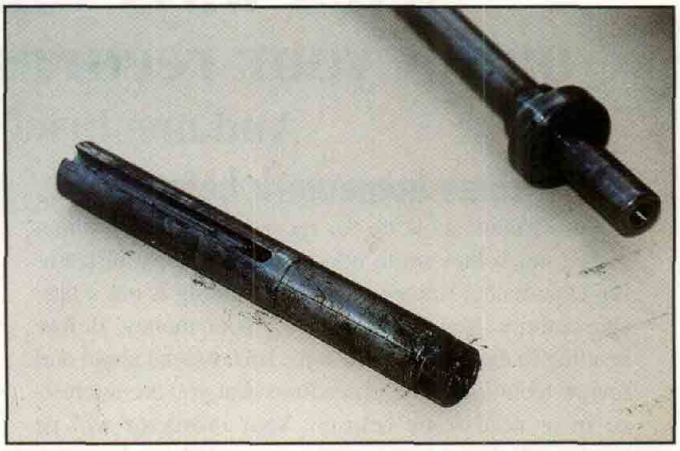
the frame behind the top roller as small as possible, so he didn't use the rectangular tubing because it would have been too deep. It would have interfered with hand rolling the top roller. However, the pressure of the lower roller pushing against the top one is pretty severe, and he didn't want the top tube to be deformed or have any more spring-back than necessary. His solution to that was the tapering reinforcement seen in the photos. This minimizes the front depth but keeps the tubing from bending.

The small box next to the base holds the various rollers and bits of tooling Younkin has designed for the machine but don't worry about trying to find one this exact shape. Jim hand made this one!

It may well be that the most difficult raw material for someone to find if he or she isn't near a large city would be the thick aluminum plate which Jim has used



The roller end of the main shaft has a collar welded in place. The top roller is clamped against that stop through the inner bearing race by spacers and the bolt in the end of the rod.



The vertical rod which mounts the bottom roller is a fairly hard piece of steel with a hole drilled in its lower end and a nut welded around it for threads. It rides up and down on the threaded rod inside the vertical tube and the slot stops it from turning. The slot is the only piece of mill work that is absolutely necessary.

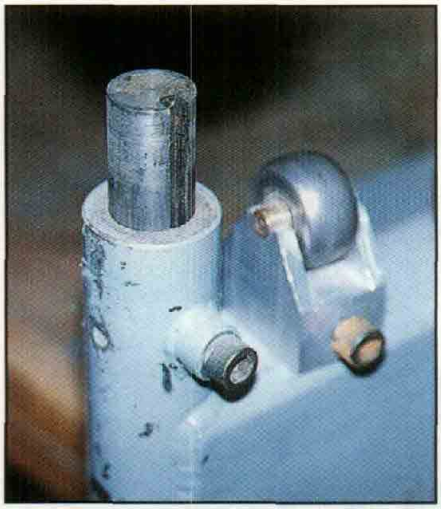
for the crank mount and some of the rollers. Steel plate could substituted which would make it a little more difficult to work, but once its chucked in a lathe it would be hard to tell the difference.

One of the most pleasing aspects to the basic design is that it is much lighter than it looks. It only weighs about 35 pounds but sits on the bench as if it weighs a ton. It is so compact it could easily be hung from a wall when not in use.

The basic design could also be enlarged slightly should a builder feel the need for something larger but didn't have a need for a full sized English wheel. However, remember there is a lot of pressure at the rollers and the rear corners of the C frame are seeing some strong bending loads so they have to be pretty stout.

We bugged Younkin enough that he and his CNC supplier have agreed to produce a set of drawings so anyone can build the neat little apparatus. He is also investigating the feasibility of producing the machined parts and possibly completed unit, if there is a demand for them. Contact Jim at Historic Aviation, 1500 S. Old Missouri Rd., Springdale, AR 72764, 501/751-0250.

If you want to strike out on your own, just study the accompanying pictures. There's nothing here the average homebuilder can't figure out and the result is a tool you'll use in a million different applications. ◆



The welded boss provides enough wall thickness to accept the stop-bolt threads.