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# Tuning the Screwless Toolmakers Vise

*Release 1*

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## 1 Introduction

These vises offer a lot of value for the money. Every one I've seen has a very well made base and jaw whose fit, precision and finishing seem uniformly excellent. But they don't work together as well as they could.

The problem lies in the screw and nut mechanism. I don't know why they call them 'screwless' because, obviously, they have one. It just works differently and, in my experience, not very well. Conceptually, the idea of applying pressure both downward and inward is great. Functionally, though, the implementation is shoddy and causes frustrating inconvenience in use. It really does need some work.

Not to worry. The fix is easy for a machining hobbyist and the vise can be made a pleasure to use. This paper describes how I modified mine.

## 2 Buying Considerations

Before considering any changes, it's good to have the right model. These vises are provided with slots milled in the base for clamping to the machine table. Mounting requires that two of the vise's slots be more or less over a table T-slot. For a vise whose width is close to that of the table, this can be a problem.

Here's what I mean. They come in three different mounting configurations and it's important to get the right one if you want to use it on a small mill like the Taig.



On the left is shown a model with mounting slots only on the end of the base. It's easy to mount this type aligned longitudinally to the X-axis. But it's just about impossible to align it to the Y-axis because the table is too narrow to support it with even one vise slot over a table T-slot.

On the right is the opposite condition, vise slots only on the side. This one's easy to align with the Y-axis and a fair range of other angles but pretty tough to align exactly along the X-axis.



The third design has slots on both ends and both sides and is the only one I'd choose for a small mill. This allows alignment to either X or Y axes and a broad range of angles in between. With narrow clamps, it can also be mounted on its end or either side making it about as flexible as possible. Oddly enough, in spite of its superiority, it seems to be the most difficult to find. But they're out there and well worth the search.



### 3 Operation

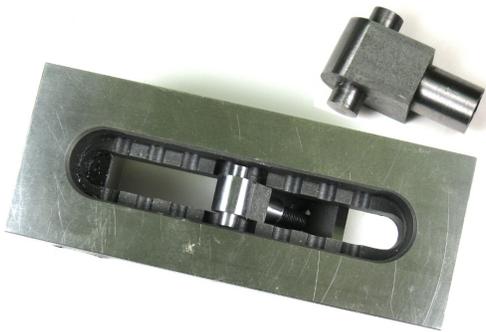
The screw in most vises has a thread length at least equal to the maximum jaw opening. It threads into a fixed nut and provides continuous jaw movement. The screw thread in these vises is quite short, threads into an adjustable nut and provides discontinuous jaw movement of only half an inch or so per setting. User satisfaction in use is highly dependant on how quickly, easily and positively the nut can be moved from one position to another.

I found the action of the stock vise quite frustrating. Moving the nut from one position to the next seemed to be just one false move after another. Since its position is hidden by the vise base and workpiece, I was always working blind. Push, pull, turn one way or the other and finally get it into a notch, maybe, and often the wrong one. That's probably an exaggeration but it's the way I remember it.

The cause of all this is the nut itself as shown at the right. It doesn't fit properly in the slot and as soon as its pins clear the notches, further turning of the screw twists them out of alignment. Getting them aligned again seems to involve as much luck as skill.



### 4 Modifications



My first change was to make a new nut that fits properly. The width of its flat now closely matches that of the slot and is long enough to prevent twisting when the pins clear the notches. Now the jaw can be moved forward or backward and a little light levering of the screw will nudge the pins naturally into the next notch.

As far as I know, these vises are all of unknown offshore manufacture and probably vary somewhat in actual size so a replacement nut needs to be custom fitted. I used a piece of 5/8 square CRS for the nut and 5/16 diameter 12L14 for the pin. I knurled the center of the pin and then pressed it into the nut. The screw hole is tapped 5/16-18 about .9" deep.

Of all the vises in my shop, this is the only one that doesn't have a built-in way to open and close the jaw. It's useless without a cumbersome hex key that always seems to be just out of reach when you need it. Functional, certainly, but not at all user friendly.

It's a pretty easy job to make a new screw with a captive tommy bar. The makers could probably turn them out for pennies apiece. But they don't, so I made my own, shown here with the device it replaced. Alternatively, even a Lee Valley snap-lock knob is an improvement over the original socket head cap screw.



Here is the final result. I've been using this modified vise on my Taig mill for several years now with complete satisfaction. The basic vise is so good that the small amount of work to improve it was more than justified.

The little vise-in-vise had exactly the same problems in miniature and was modified in the same way as the big one.



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